Secrétariat général
SPSSI/PSI1

Septembre 2011

Matrices de Clementini et Prédicats spatiaux de l'OGC

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Ministère de l'Écologie, du Développement durable, des Transports et du Logement

Sommaire

Introduction

Les bases de données relationnelles à cartouche spatiale comme PostGreSQL/PostGis et les outils SIG bureautiques émergents comme QGIS permettent d'effectuer des requêtes spatiales à l'aide d'opérateurs géographiques normalisés.

Ces opérateurs ou prédicats spatiaux offrent une palette beaucoup plus large de types de requêtes spatiales que MapInfo®, permettant ainsi de traduire plus précisément les interrogations des géomaticiens dans le cadre de l'analyse spatiale.

Certains d'entre eux (Within, Contains), malgré une homonymie redoutable, ne produisent pas les mêmes résultats sur des croisements de données identiques, car ils n'utilisent pas les centroïdes des objets géométriques mais leur géométrie intégrale.

La normalisation de ces prédicats est issue des travaux de recherche fondamentale en topologie menés notamment par Max J. Egenhofer, Robert D. Franzosa, John R. Herring, Eliseo Clementini, Paolino Di Felice, Peter van Oosterom et Robert Laurini.

La bibliographie annexée liste les articles fondateurs publiés depuis 1989 par ces éminents spécialistes.

Après avoir rappelé le cadre normatif des relations spatiales dans les SIG, ce document compare les résultats des requêtes spatiales effectuées d'une part avec MapInfo® et d'autre part avec QGIS (V1.7), dresse l'inventaire des relations spatiales existant entre les trois types d'objets géométriques simples (point, polyligne, polygone) et classe *in fine* les relations topologiques par prédicat.

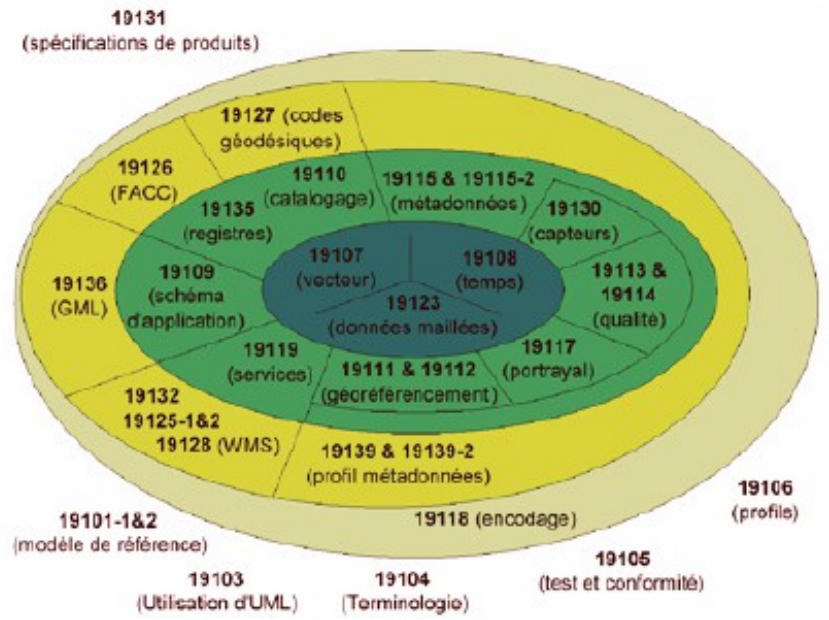
Ce document est téléchargeable sur l'Espace Interministériel de l'Information Géographique GéoInformations : http://geoinfo.metier.i2/qgis-documents-et-fiches-a1853.html

1 - Normes applicables au schéma spatial et aux relations entre objets

Une fonction essentielle des systèmes d'information géographique est de déterminer les relations spatiales existant entre les objets géographiques.
Ces relations et le schéma spatial modélisant le monde réel font l'objet de normes définies par l'Organisation Internationale de Normalisation (ISO) [http://www.iso.org/] et l'Open Geospatial Consortium (OGC) [http://www.opengeospatial.org/].

1.1 - Normes ISO

Le comité technique 211 (ISO/TC 211) [http://www.isotc211.org/] a été créé en 1994 au sein de l'ISO pour répondre au besoin de standardisation du domaine de l'information géographique.
Parmi les membres du TC 211 figurent l'IAG (International Association of Geodesy) et l'OGC.
Le comité technique 211 est organisé en équipes projets ayant chacune en charge un domaine particulier de l'information géographique.
Les travaux du TC 211 ont abouti à la publication de nombreuses normes en matière d'information géographique dont notamment la série de normes 191xx :



Normes ISO en information géographique (source : www.ird.fr, droits réservés)

Dans cet ensemble de normes, celles relatives au schéma spatial et aux relations entre objets sont les suivantes :

ISO 19107 : Publiée en 2003, elle décrit les caractéristiques des entités vectorielles représentant une abstraction du monde réel (schéma spatial).

ISO 19111 : Publiée en 2007, elle décrit les informations minimales permettant de définir les systèmes de référence par coordonnées spatiales (géoréférencement).

ISO 19125-1 : Publiée en 2004, elle établit une architecture commune pour l'information géographique et normalise les noms et les définitions des types de géométries (IG - accès aux entités simples 1 Architecture commune).

ISO 19125-2 : Publiée en 2004, elle définit un schéma SQL (Structured Query Language) standard qui supporte le stockage, l'extraction, l'interrogation et la mise à jour des entités géographiques (IG - accès aux entités simples 2 Options SQL).

ISO 19137 : Publiée en 2007, elle décrit le profil minimal du schéma spatial défini par l'ISO 19107.
Un objet est composé de points, ou de courbes (elles-mêmes décomposables en polylignes) ou de surfaces (décomposables en polygones).

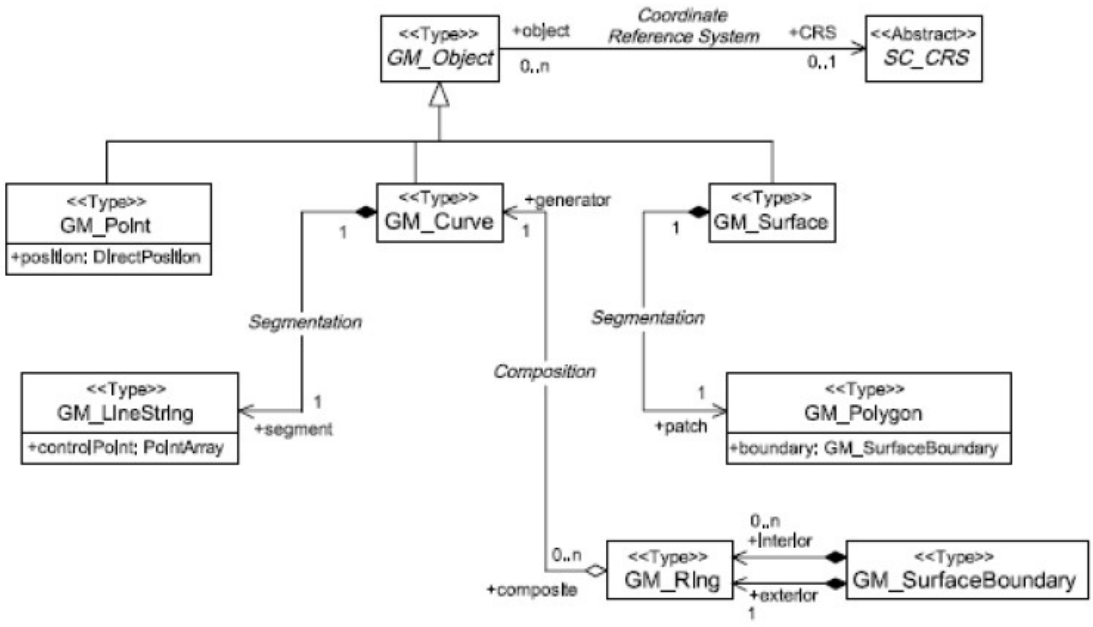


Schéma spatial ISO 19137 profil minimal (source : ISO/TC 211 Standards Guide)

1.2 - Normes OGC

L'Open Geospatial Consortium a publié en 2010 la version 1.2.1 de deux normes fondamentales conformes à l'ISO 19125 et au schéma spatial de l'ISO 19107:

OGC 06-103r4 : Implémentation standard pour l'IG – Accès aux entités simples Partie 1 Architecture commune. [http://www.opengeospatial.org/standards/sfa]
Cette norme décrit notamment le schéma spatial (modélisation du monde réel) et les méthodes pour tester les relations spatiales entre objets géométriques.

OGC 06-104r4 : Implémentation standard pour l'IG – Accès aux entités simples Partie 2 Option SQL.
Cette norme définit un schéma SQL qui supporte le stockage, l'extraction, l'interrogation et la mise à jour des entités géographiques. [http://www.opengeospatial.org/standards/sfs]

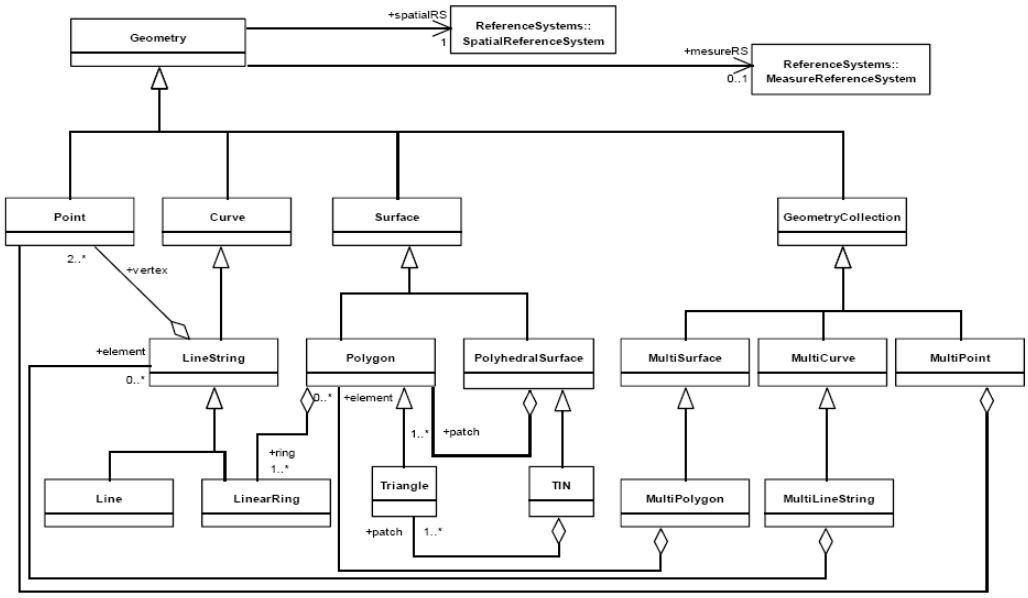


Schéma spatial OGC complet (source : OGC)

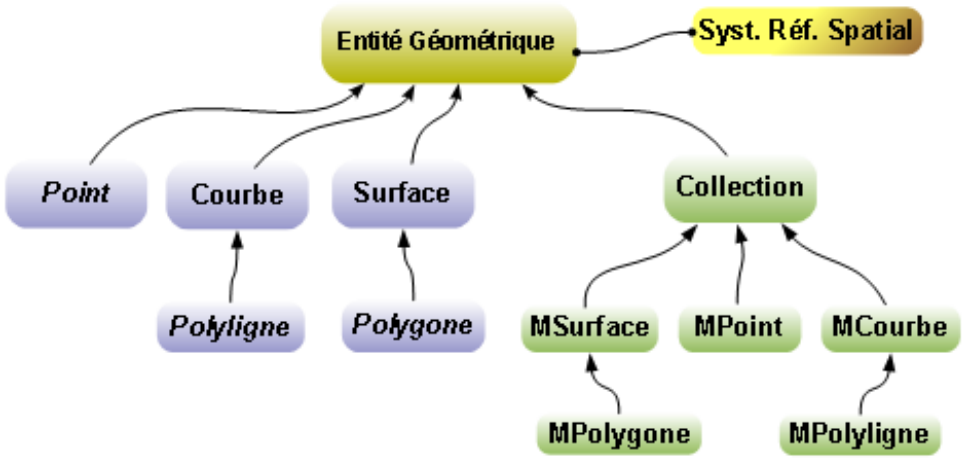


Schéma spatial 2D simplifié

2 - Relations spatiales 2D entre objets géométriques simples

2.1 - Types d'objets

Les objets simples manipulables décrits par l'OGC dans un espace à deux dimensions sont les suivants :

Le point : objet géométrique de **dimension 0** représentant une localisation unique (coordonnées x,y) dans l'espace à 2 dimensions.

La polyligne : objet géométrique de **dimension 1**. C'est une courbe composée de segments linéaires.
Une polyligne simple a seulement deux extrémités (points) non confondues et ne se recoupe pas.

Le polygone : objet géométrique de **dimension 2**. Surface plane définie par une limite extérieure et 0 ou plusieurs limites intérieures (trous).
Un polygone simple est topologiquement fermé, sa limite est constituée d'anneaux (polylignes fermées), deux anneaux ne doivent pas se croiser et le ou les anneaux intérieurs peuvent toucher la limite extérieure en un seul point.

Il existe également des objets multiples et des collections d'objets. Seuls les objets simples sont étudiés dans ce qui suit.

2.2 - Concepts d'intérieur, de limite, d'extérieur des objets

Les relations spatiales entre objets géométriques utilisent les notions d'intérieur, de limite et d'extérieur des objets (*jamais les centroïdes* qui n'interviennent pas dans les relations spatiales normalisées).

Intérieur : Objet géométrique à l'exception de sa limite.
Limite : Ensemble d'objets géométriques de dimension inférieure d'une unité à celle de l'objet.
Extérieur : Ensemble des points de l'espace qui ne sont pas à l'intérieur de l'objet ou sur sa limite.

Le tableau ci-dessous définit ces concepts pour les objets simples :

	Intérieur	Limite	Extérieur
Point Dim = 0	Dim = 0	N'existe pas	
Polyligne Dim = 1	Dim = 1	Dim = 0	
Polygone Dim = 2	Dim = 2	Dim = 1	

La dimension de l'extérieur des objets est toujours égale à 2, aucun polygone n'ayant réellement de surface infinie.

2.3 - Relations topologiques entre 2 objets géométriques

Elles sont exprimées par une **matrice (3,3)** calculant la **dimension maximale** des **9 intersections** deux à deux des intérieurs, limites et extérieurs des 2 objets.

La dimension des intersections peut prendre les valeurs suivantes :

-1 = Ø (n'existe pas)
0 = point
1 = polyligne
2 = surface

Pour deux objets A et B (point, polyligne oupolygone), la matrice d'intersection a ainsi la forme suivante :

	Intérieur (B)	Limite (B)	Extérieur (B)
Intérieur (A)	dim(I(A) ∩ I(B))	dim(I(A) ∩ L(B))	dim(I(A) ∩ E(B))
Limite (A)	dim(L(A) ∩ I(B))	dim(L(A) ∩ L(B))	dim(L(A) ∩ E(B))
Extérieur (A)	dim(E(A) ∩ I(B))	dim(E(A) ∩ L(B))	dim(E(A) ∩ E(B))

Les 3 cellules de la première ligne de la matrice contiennent le nombre (-1, 0, 1 ou 2) représentant la dimension de l'intersection de l'intérieur de A avec l'intérieur de B, de l'intérieur de A avec la limite de B et de l'intérieur de A avec l'extérieur de B.
Les deux autres lignes concernent les intersections de la limite et de l'extérieur de A avec l'intérieur, la limite et l'extérieur de B.

C'est le modèle à 9 intersections étendu dimensionnellement dénommé **DE-9IM** ou **matrice de Clementini,** standardisé par l'OGC.

Le **DE-9IM** (Dimensionnally Extended Nine Intersection Model) de Clementini et Di Felice (1995) est une extension du modèle à 9 intersections (**9IM**) d'Egenhofer et Herring (1991), qui considère seulement le caractère vide ou non vide des 9 intersections.
Le **9IM** est issu du modèle à 4 intersections (**4IM**) d'Egenhofer (1990), modèle qui ne comprenait pas les intersections des extérieurs des objets.

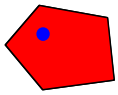
L'application des contraintes topologiques décrites patr Max J. Egenhofer aboutit à un nombre restreint de relations topologiques possibles ou réelles.
On dénombre 98 relations topologiques réelles entre objets géométriques simples **P** (point), **L** (polyligne) et **S** (polygone) :

2 relations P/P **3 P/L** **3 P/S**	**47 relations L/L** **31 L/S**	**12 relations S/S**

On peut ainsi créer un grand nombre d'opérateurs géographiques correspondant à des types de requêtes qu'on ne pourrait pas mettre en oeuvre avec les opérateurs classiques des logiciels SIG.

2.4 - Exemples de matrices d'intersection

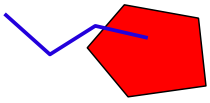
Point/Polygone



A \ B	I	L	E
I	0	-1	-1
L	-1	-1	-1
E	2	1	2

DE-9IM = $\begin{bmatrix} 0 & -1 & -1 \\ -1 & -1 & -1 \\ 2 & 1 & 2 \end{bmatrix}$

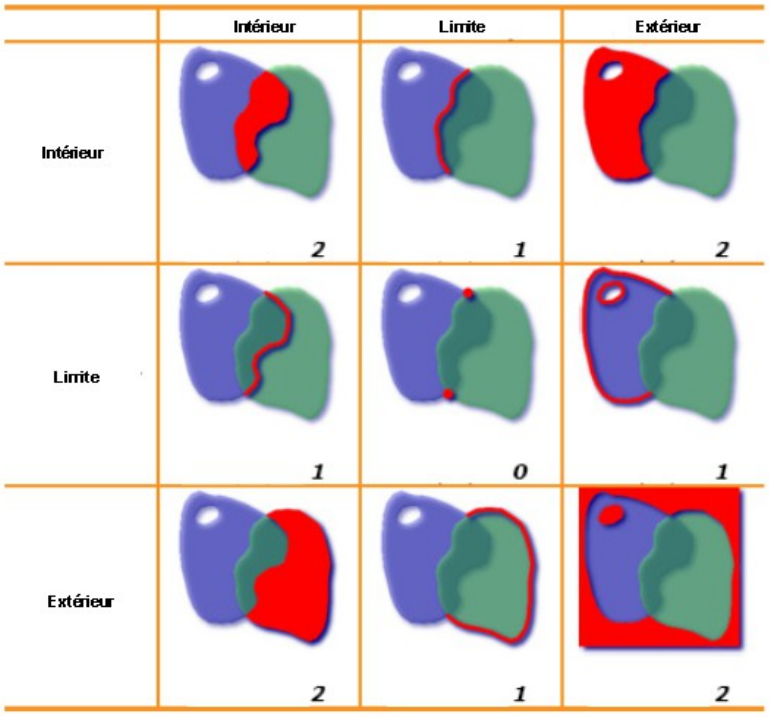
Polyligne/Polygone



A \ B	I	L	E
I	1	0	1
L	0	-1	0
E	2	1	2

DE-9IM = $\begin{bmatrix} 1 & 0 & 1 \\ 0 & -1 & 0 \\ 2 & 1 & 2 \end{bmatrix}$

Polygone/Polygone



DE-9IM = $\begin{bmatrix} 2 & 1 & 2 \\ 1 & 0 & 1 \\ 2 & 1 & 2 \end{bmatrix}$

source : guide PostGis http://postgis.org/download/postgis-1.5.2.pdf

En lisant la matrice ligne par ligne on obtient la chaîne de caractères qui la représente :

DE-9IM = '212101212'

3 - Prédicats topologiques de l'OGC

Les prédicats ou opérateurs topologiques sont des matrices de Clementini contenant des valeurs particulières des intersections (valeurs uniques : **F** *(équivalent à-1)*, **0**,**1**,**2** ou valeurs génériques (jokers) : **T**, ***)** .
Ce sont des fonctions booléennes nommées (ex : Intersects, Within, Contains, Overlaps).

Ils retournent la valeur **vrai** ou **faux** et sont utilisés pour tester si une relation spatiale particulière existe entre deux objets géométriques.

L'OGC a défini **8 prédicats topologiques** listés dans le tableau ci-dessous auxquels s'ajoutent 2 prédicats (Covers et CoveredBy) présents notamment dans Oracle spatial, JTS, GEOS, PostGis.

La colonne 'Types d'objets' indique entre quels types d'objets géographiques (P point, L polyligne, S polygone) ces prédicats sont applicables (6 couples sont possibles : P/P, P/L, P/S, L/L, L/S S/S).

Prédicat	Types d'objets (P point, L polyligne, S polygone)	Conditions
Equals	**Tous**	A **Equals** B si les objets sont géométriquement identiques : relation topologique (le nombre de sommets des 2 objets peut être différent)
Disjoint	**Tous**	A **Disjoint** B si les objets n'ont aucun point commun (intérieur et limite). (Inverse de Intersects)
Touches	**S/S, L/S, L/L, P/S, P/L**	A **Touches** B si les limites des objets ont au moins un point commun et si les intérieurs n'ont pas de point commun (non applicable à P/P)
Crosses	**P/S, P/L, L/S, L/L**	A **Crosses** B si les intérieurs ont au moins un point commun mais pas tous et si la dimension de l'intersection des intérieurs est inférieure à la dimension maximale des objets A et B (non applicable à P/P, S/S)
Within	**Tous**	A **Within** B si tout point de A est un point de B et si les intérieurs ont au moins un point commun (aucun point de A n'est à l'extérieur de B). (Inverse de Contains)
Contains	**Tous**	A **Contains** B si tout point de B est un point de A et si les intérieurs ont au moins un point commun (aucun point de B n'est à l'extérieur de A). (Inverse de Within)
Overlaps	**S/S, L/L, P/P**	A **Overlaps** B si à la fois : - A et B ont la même dimension (non applicable à P/L, P/S, L/S) - A et B ont des points en commun, mais pas tous - L'intersection des intérieurs de A et de B a la même dimension que A et B
Intersects	**Tous**	A **Intersects** B si A et B ont au moins un point commun (intérieur ou limite) (Inverse de Disjoint)
Covers (*)	**Tous**	A **Covers** B si aucun point de B n'est à l'extérieur de A (tout point de B est un point de A) (à comparer à Contains)
CoveredBy (*)	**Tous**	A **CoveredBy** B si aucun point de A n'est à l'extérieur de B (tout point de A est un point de B) (à comparer à Within)
Relate (A,B, DE-9IM Pattern Matrix)	**Tous**	Exprime la relation spatiale de A et de B à l'aide de la matrice modèle DE-9IM Permet la généralisation des prédicats spatiaux aux 98 relations topologiques. Ex : **Relate** (A, B, « 0F1FF0102 ») <=> A Intersects B

(*) : Prédicats non définis par la norme OGC, présents dans Oracle spatial, JTS, GEOS, PostGis

Le prédicat général **Relate** (présent dans PostGis mais pas dans la version 1.7 de QGIS) permet de fabriquer des opérateurs géographiques «sur mesure», en définissant la relation spatiale à l'aide d'une chaîne de caractères représentant une matrice de Clementini.
On peut ainsi adapter précisément l'opérateur géographique à la requête spatiale que l'on souhaite mettre en oeuvre, en plus des prédicats standards définis par l'OGC.

Les prédicats définis par l'OGC peuvent correspondre à plusieurs matrices de Clementini, les cellules de celles-ci pouvant prendre un certain nombre de valeurs possibles.

Prenons par exemple le prédicat **Disjoint**, dont l'interprétation géométrique est intuitive : deux objets sont disjoints s'ils n'ont **aucun point commun (intérieur et limite)**.
Détaillons la matrice de Clementini qui caractérise la relation Disjoint, en précisant les valeurs possibles de chaque intersection :

A \ B	I	L	E
I	-1	-1	-1,0,1,2
L	-1	-1	-1,0,1,2
E	-1,0,1,2	-1,0,1,2	-1,0,1,2

La cellule n°1 ne peut contenir que la valeur -1 (les intérieurs des objets n'ont aucun point commun).
La cellule n°2 ne peut contenir que la valeur -1 (l'intérieur de A n'a pas de point commun avec la limite de B).
Réciproquement, la cellule n° 4 ne peut aussi contenir que la valeur -1.
De même la cellule n°5 ne peut contenir que la valeur -1, les limites des 2 objets n'ayant aucun point commun.
Le contenu de ces 4 cellules étant nécessaire et suffisant pour caractériser la relation **Disjoint,** les autres cellules de la matrice peuvent contenir n'importe quelle valeur, -1, 0, 1 ou 2.

En pratique, le nombre de valeurs que peuvent contenir les cellules 3, 6, 7, 8 et 9 est plus réduit (par exemple l'intersection des extérieurs des objets est toujours égal à 2).
Le nombre de matrices de Clementini possibles (comprenant la valeur numérique de la dimension des intersections) correspondant au prédicat Disjoint s'élève ainsi à 9.
Afin de généraliser et de simplifier l'écriture des matrices correspondant aux prédicats de l'OGC, des matrices modèles (**pattern matrix**) ont été définies.
Chaque matrice modèle correspond à un prédicat unique, mais la réciproque n'est pas toujours vraie, un prédicat pouvant être représenté par plusieurs matrices modèles.
Chaque cellule de la matrice contient une valeur unique **(-1 ou F,0,1,2)** ou générique **(T,*)** .
Les valeurs génériques ou jokers peuvent prendre une des valeurs qu'ils représentent, par exemple T peut être remplacé par 0, 1 ou 2.

La matrice-modèle correspondant au prédicat **Disjoint** est :

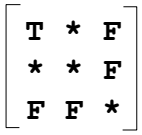
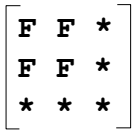
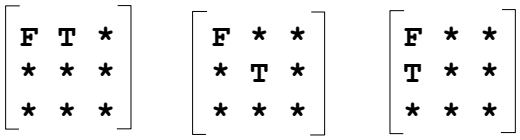
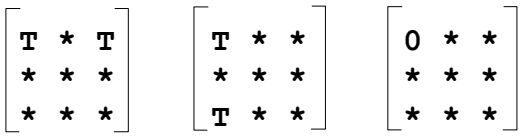
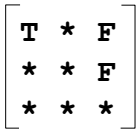
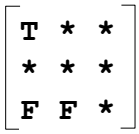
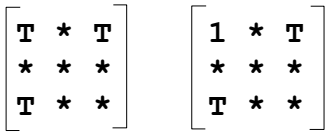
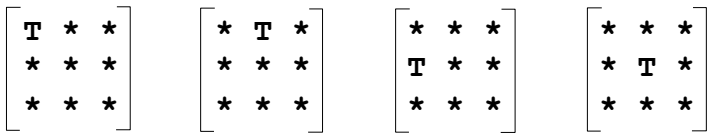
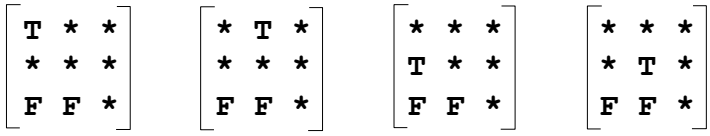
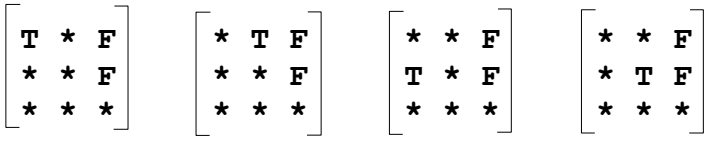
$$\begin{bmatrix} F & F & * \\ F & F & * \\ * & * & * \end{bmatrix}$$

ou ' FF*FF** '**

Il existe 9 valeurs possibles pour les éléments de la matrice-modèle :

Valeur	Signification
T	Une intersection existe : **dim ∈ { 0, 1, 2 }**
F	Il n'existe pas d'intersection : **dim = -1**
*	L'intersection est indéterminée : **dim ∈ { -1, 0, 1, 2 }**
0	L'intersection est de type ponctuel : **dim = 0**
1	L'intersection est de type linéaire : **dim = 1**
2	L'intersection est de type surfacique : **dim = 2**

Le tableau ci-dessous présente l'ensemble des matrices modèles correspondant aux prédicats topologiques de l'OGC :

Prédicat topologique	Matrice(s) modèle(s)
Equals	
Disjoint	
Touches	
Crosses	
Within	
Contains	
Overlaps	
Intersects	
Covers	
CoveredBy	

Certains prédicats (**Intersects** par exemple) correspondent à plusieurs matrices modèles : si les deux objets ont au moins un point commun (intérieur ou limite) le prédicat Intersects retournera la valeur vrai.

Pour que les deux objets aient au moins un point commun, au moins une des conditions suivantes doit être réalisée :

- L'intérieur de A a au moins un point commun avec l'intérieur de B
- L'intérieur de A a au moins un point commun avec la limite de B
- La limite de A a au moins un point commun avec l'intérieur de B
- La limite de A a au moins un point commun avec la limite de B

On voit que les 4 matrices modèles correspondant au prédicat **Intersects** traduisent ces quatre conditions qui sont nécessaires et suffisantes. Les valeurs des autres cellules de ces matrices n'ont pas d'importance, c'est pourquoi elles sont représentées par le joker * dans ces matrices modèles.

On peut aussi représenter les matrices modèles sous forme de chaînes de caractères, en les lisant ligne à ligne.

Par exemple, la chaîne **' FF*FF**** '** représente le prédicat **Disjoint** .

Chaînes de caractères représentant les matrices modèles (masques des prédicats)

Equals	**T*F **F FF***
Disjoint	**FF* FF* *****
Touches	**{ FT* *** *** , F** *T* *** , F** T** *** }**
Crosses	**{ T*T *** *** (P/L, P/S, L/S), T** *** T** (L/P, L/S, S/L), 0** *** *** (L/L) }**
Within	**T*F **F *****
Contains	**T** *** FF***
Overlaps	**{ T*T *** T** (P/P, S/S) , 1*T *** T** (L/L)}**
Intersects	**{ T** *** ***, *T* *** ***, *** T** ***, *** *T* *** }**
Covers	**{ T** *** FF*, *T* *** FF*, ***T**FF*, *** *T* FF* }**
CoveredBy	**{ T*F **F ***, *TF **F ***, **F T*F ***, **F *TF *** }**

Certains masques de prédicats ne s'appliquent qu'à des relations entre objets d'un type particulier. (ex : Pour **Crosses**, le masque **' 0** *** *** '** ne concerne que les relations polyligne-polyligne).

4 - Applications pratiques : tests

4.1 - Un outil gratuit pour explorer les prédicats topologiques : JTS

JTS Topology Suite (acronyme récursif) est une API open source développée en Java
[http://www.vividsolutions.com/jts/jtshome.htm]

- JTS est conforme aux normes de l'OGC
- JTS utilise les prédicats topologiques normalisés en schéma spatial 2D
- JTS est téléchargeable ici (V 1.12) : [http://sourceforge.net/projects/jts-topo-suite/]

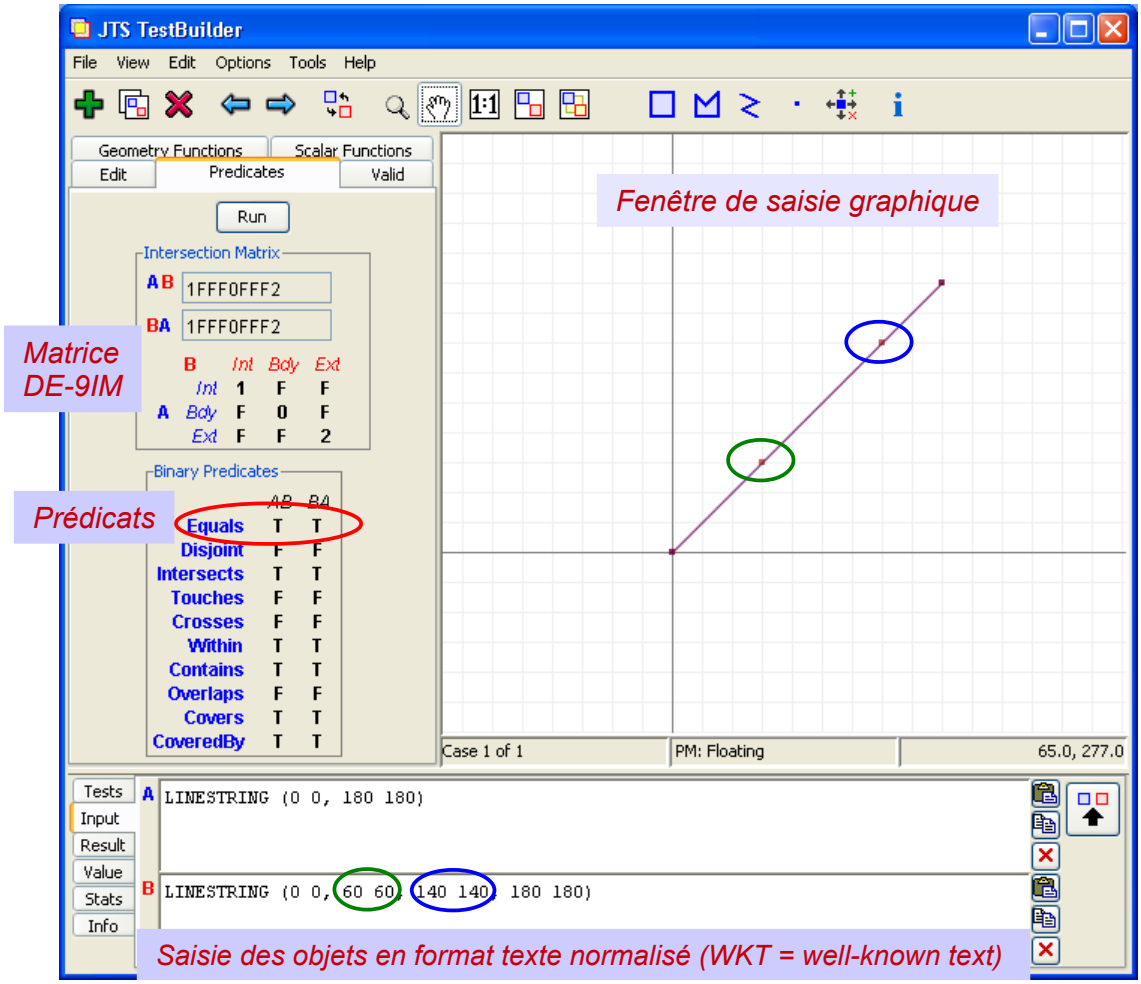
L'application JTS Test Builder (testbuilder.bat contenu dans le dossier ' \JTS_1_12\bin' après l'installation de JTS) permet d'expérimenter l'API JTS :

Elle calcule la matrice DE-9IM et la valeur (vrai T, faux F) des prédicats spatiaux pour 2 objets (point, polyligne, polygone) saisis graphiquement dans la fenêtre de dessin ou en texte par les coordonnées de leurs sommets.

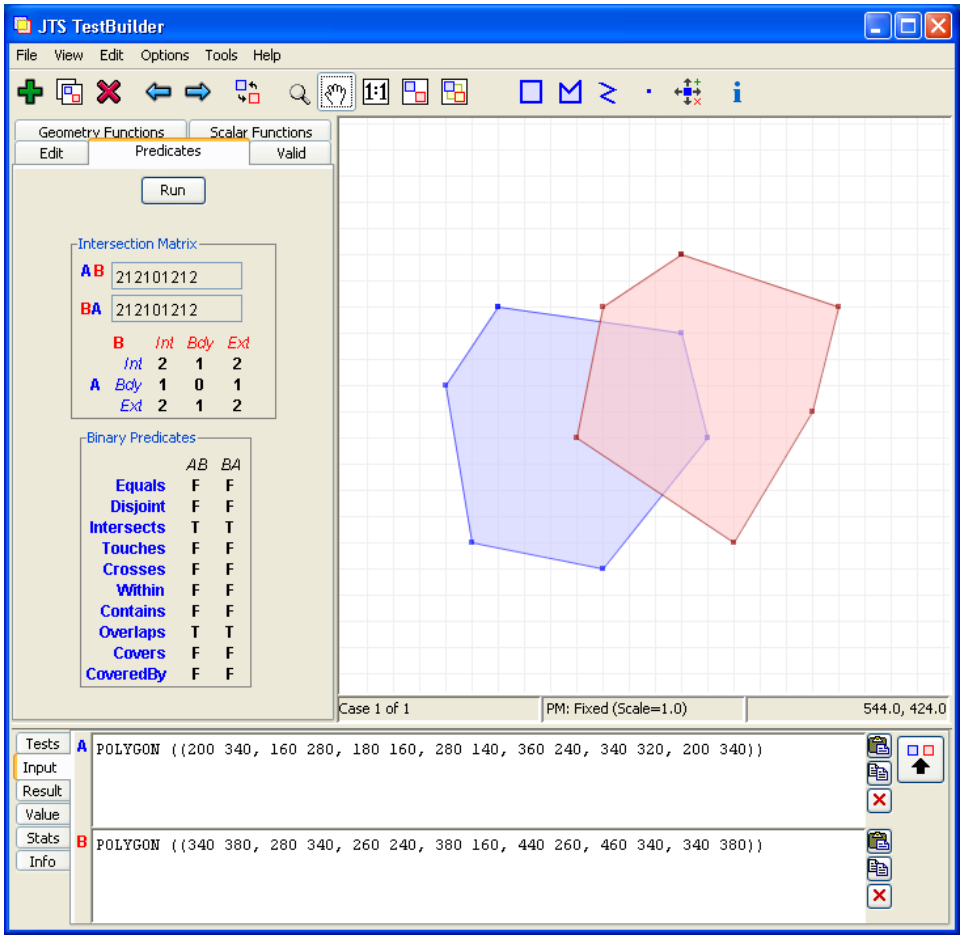
Exemple de relation topologique polyligne-polyligne à l'aide de l'API JTS

Le prédicat Equals retourne la valeur vrai. C'est bien une **relation topologique** qui est calculée et pas seulement une correspondance point à point des objets.

Deux objets spatialement identiques mais n'ayant pas le même nombre de points sont égaux



Exemple de relation spatiale polygone-polygone à l'aide de l'API JTS



La matrice d'intersection prend la valeur '**212101212**', conformément à l'exemple de relation polygone/polygone présenté précédemment.

Les prédicats suivants retournent la valeur vrai : **Intersects**, **Overlaps**.

Sur la base des éléments de théorie précédents, il est possible de comparer les résultats des requêtes spatiales effectuées au moyen des logiciels utilisés en géomatique (MapInfo®, QGIS) à ceux des prédicats spatiaux de l'OGC définis par leurs matrices modèles.
Cet exercice s'applique à toutes les relations spatiales existant entre objets géométriques simples.

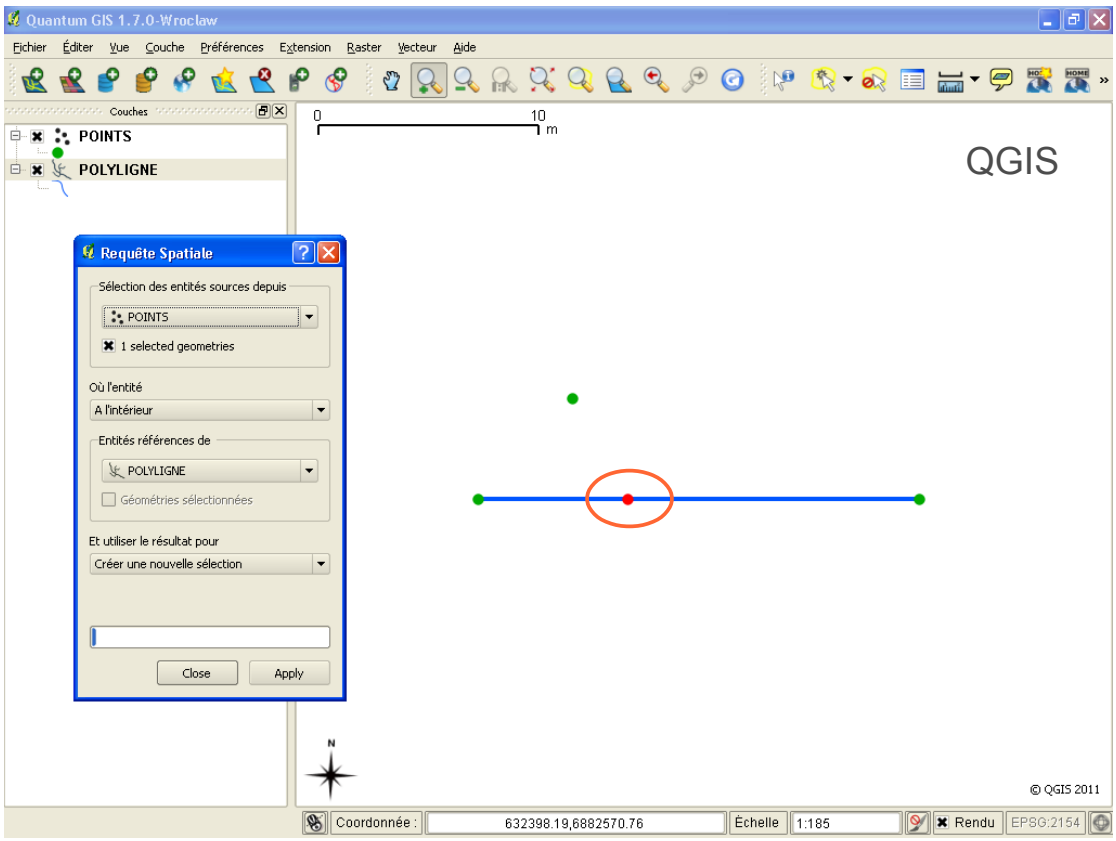
4.2 - Un logiciel Open Source pour tester les prédicats OGC : QGIS

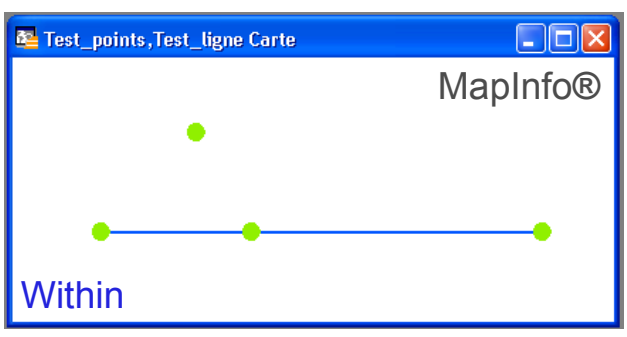
QGIS [http://www.qgis.org/] et notamment son extension « Requête spatiale » utilise la bibliothèque GEOS (Geometry Engine, Open Source) [http://trac.osgeo.org/geos/] qui est une transposition en C++ de l'API JTS.
Le SGBDR spatial PostGis utilise aussi la bibliothèque GEOS.
Les opérateurs géographiques de QGIS sont donc identiques aux prédicats topologiques de l'OGC.
Les tests qui suivent ont été réalisés avec la version 1.7 de QGIS.

Tests comparatifs entre les prédicats spatiaux OGC(QGIS) et les opérateurs géographiques MapInfo®

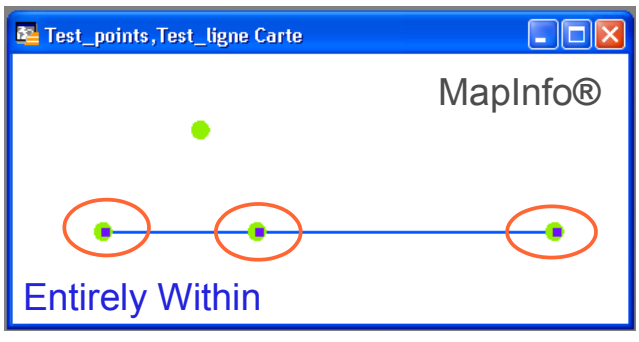
Relations points-polylignes

Within



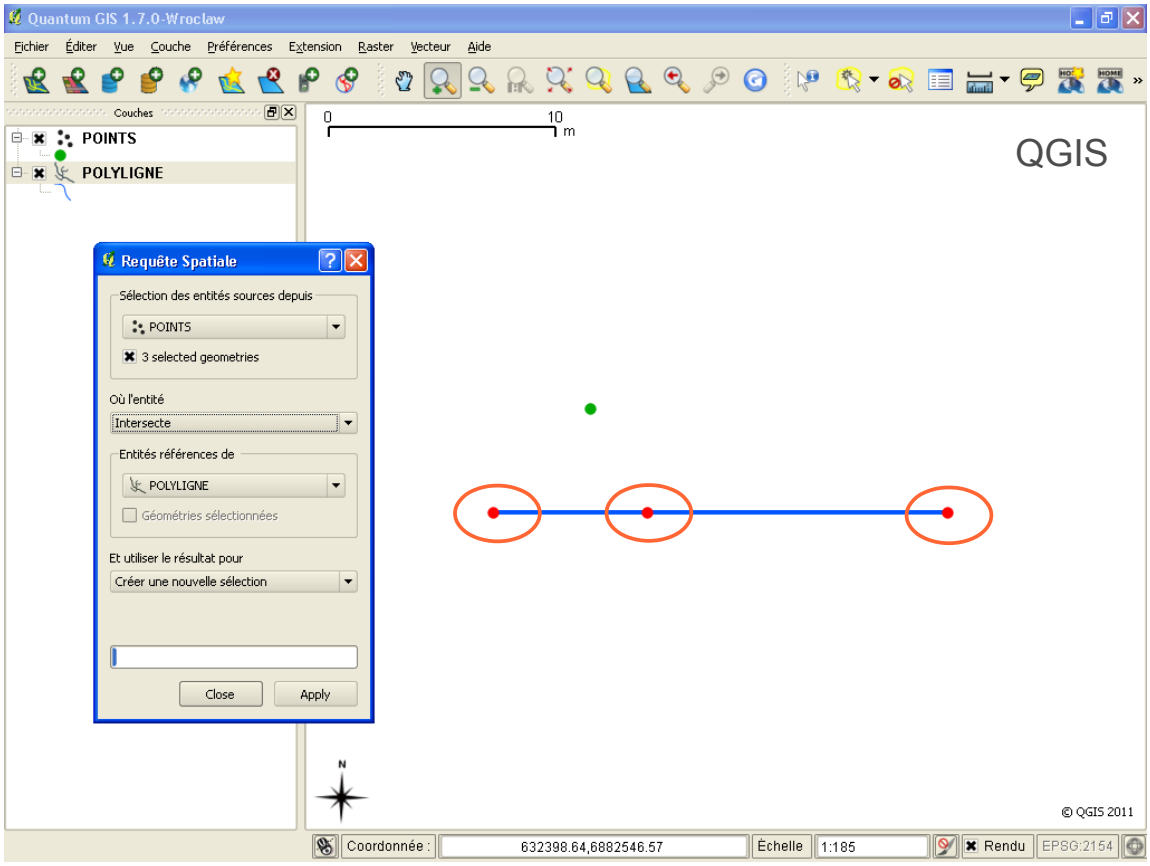


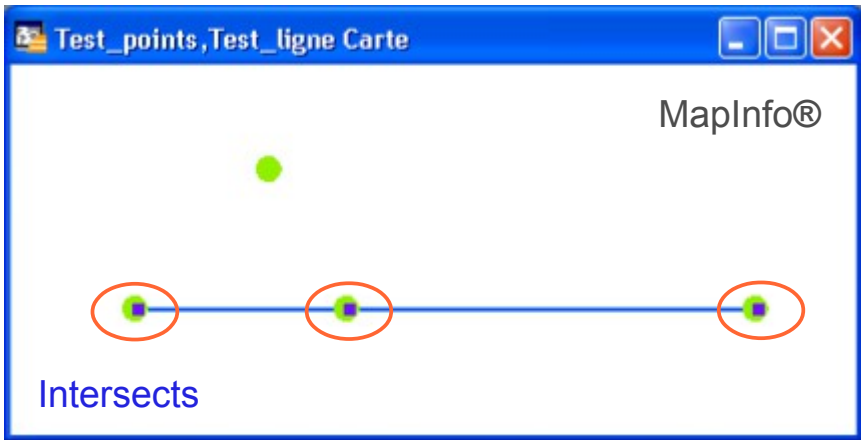
Avec Within : résultat différent



Avec Entirely Within : résultat différent

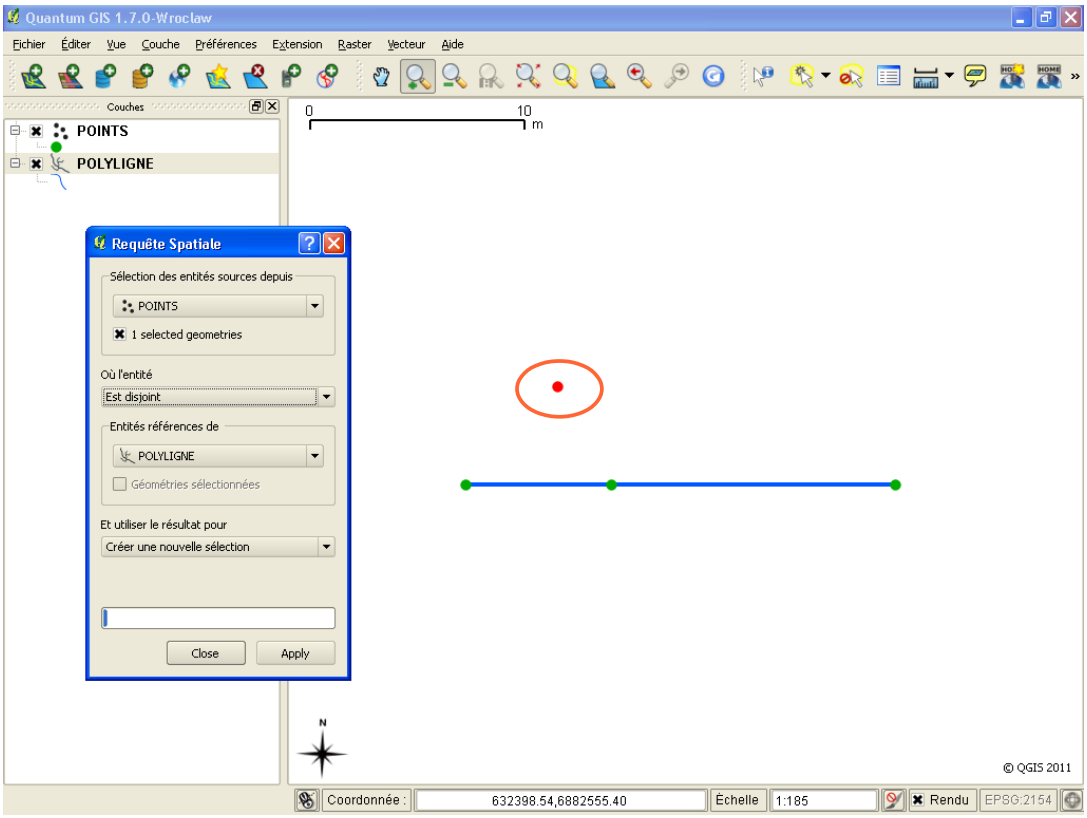
Intersects



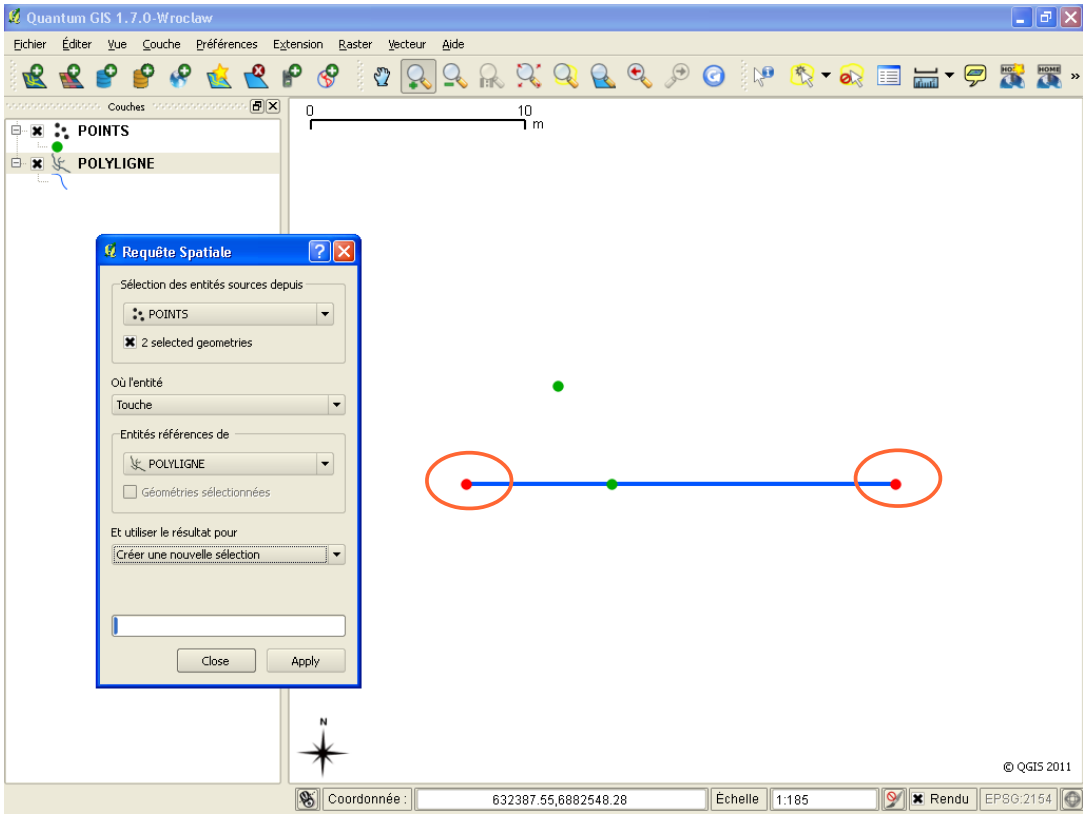


Avec Intersects : résultat identique

Disjoint (n'existe pas dans MapInfo®)

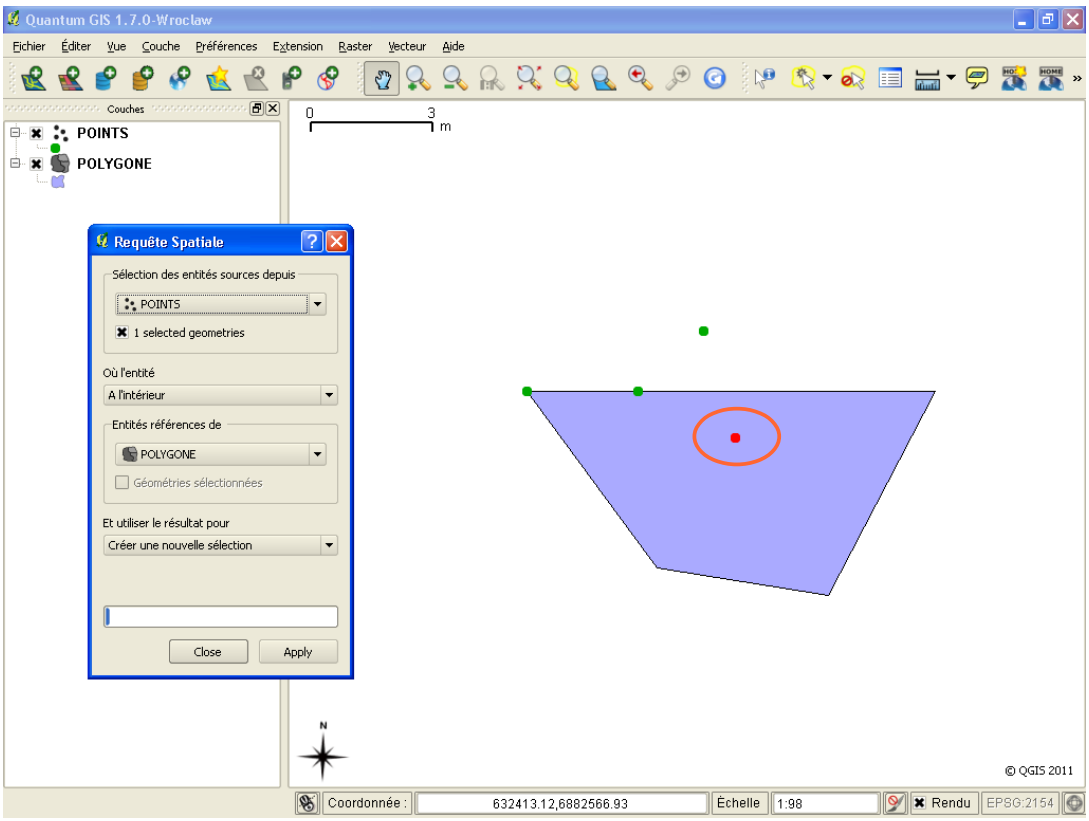


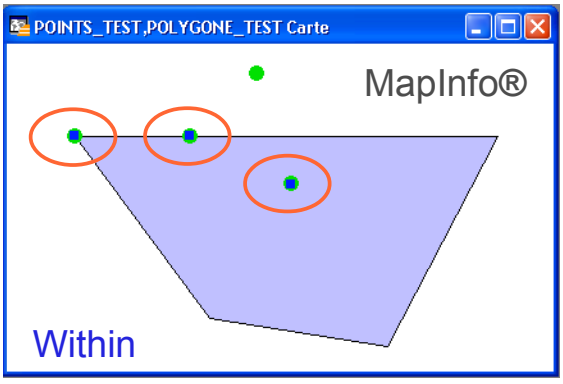
Touches (n'existe pas dans MapInfo®)



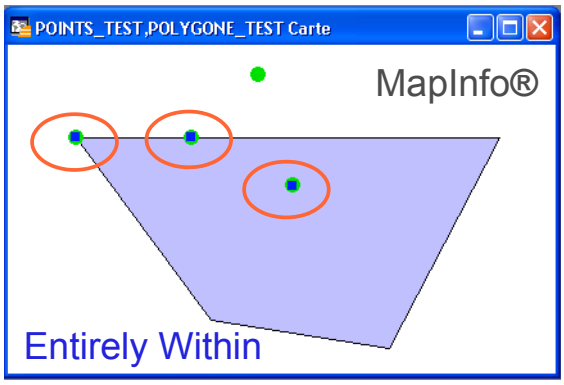
Relations points-polygones

Within



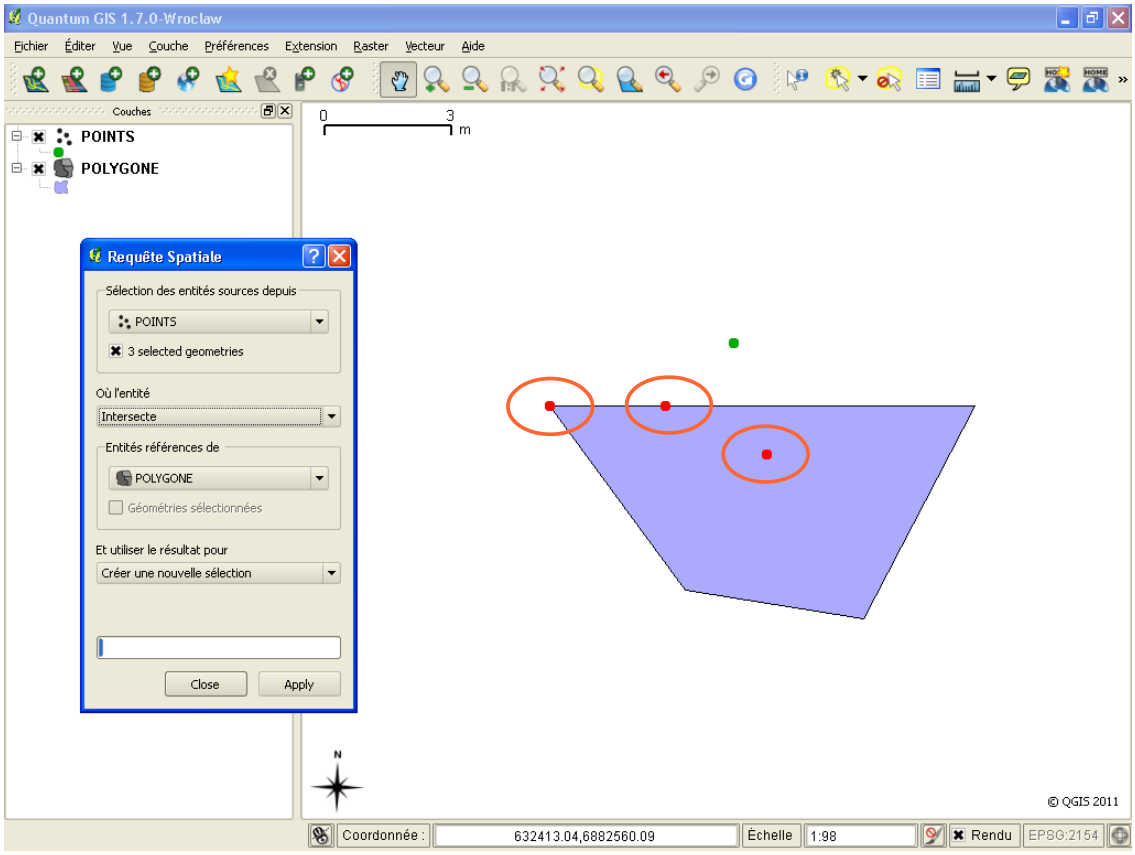


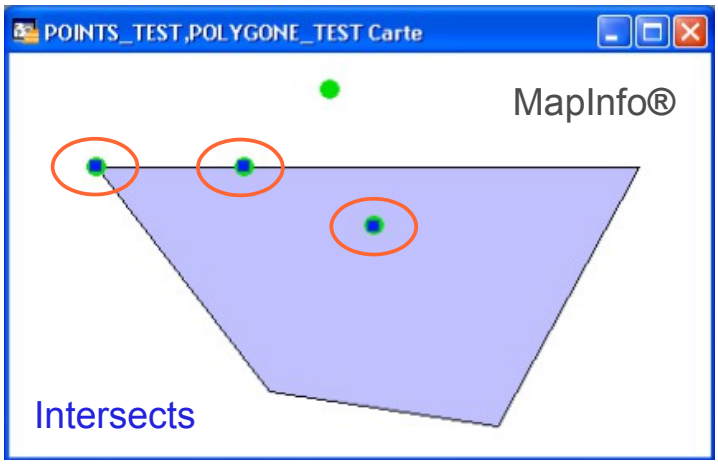
Avec Within : résultat différent



Avec Entirely Within : résultat différent

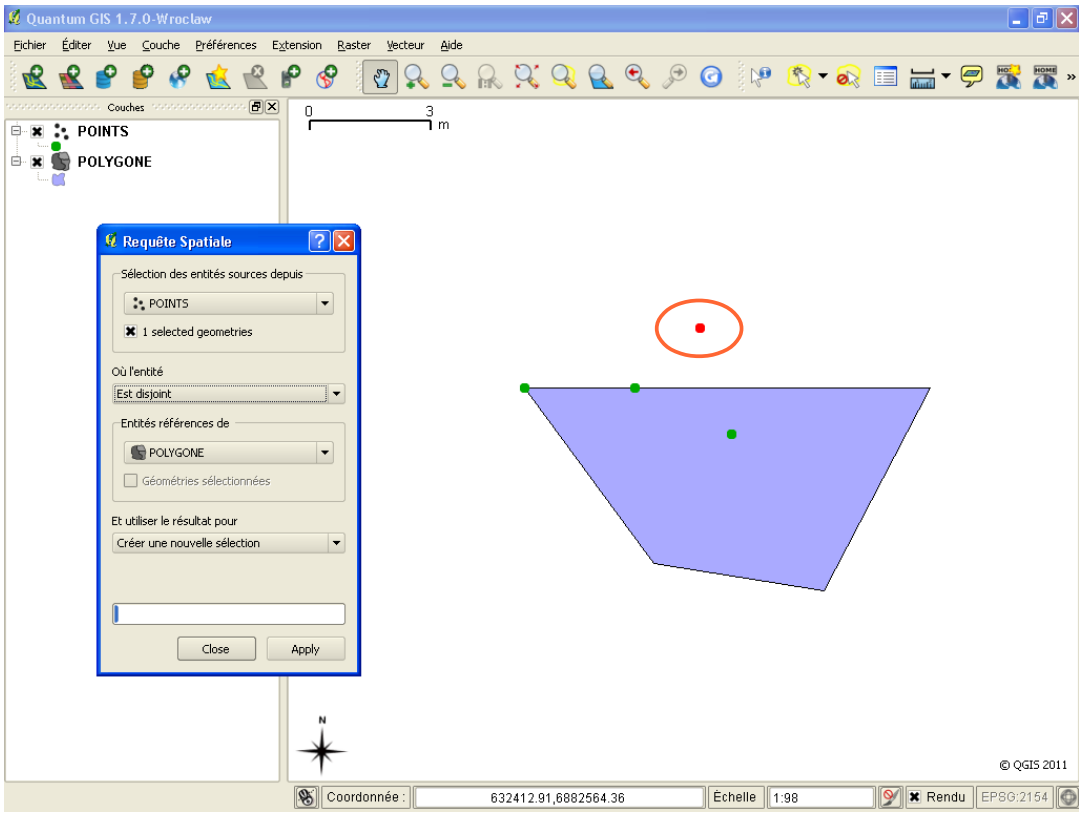
Intersects



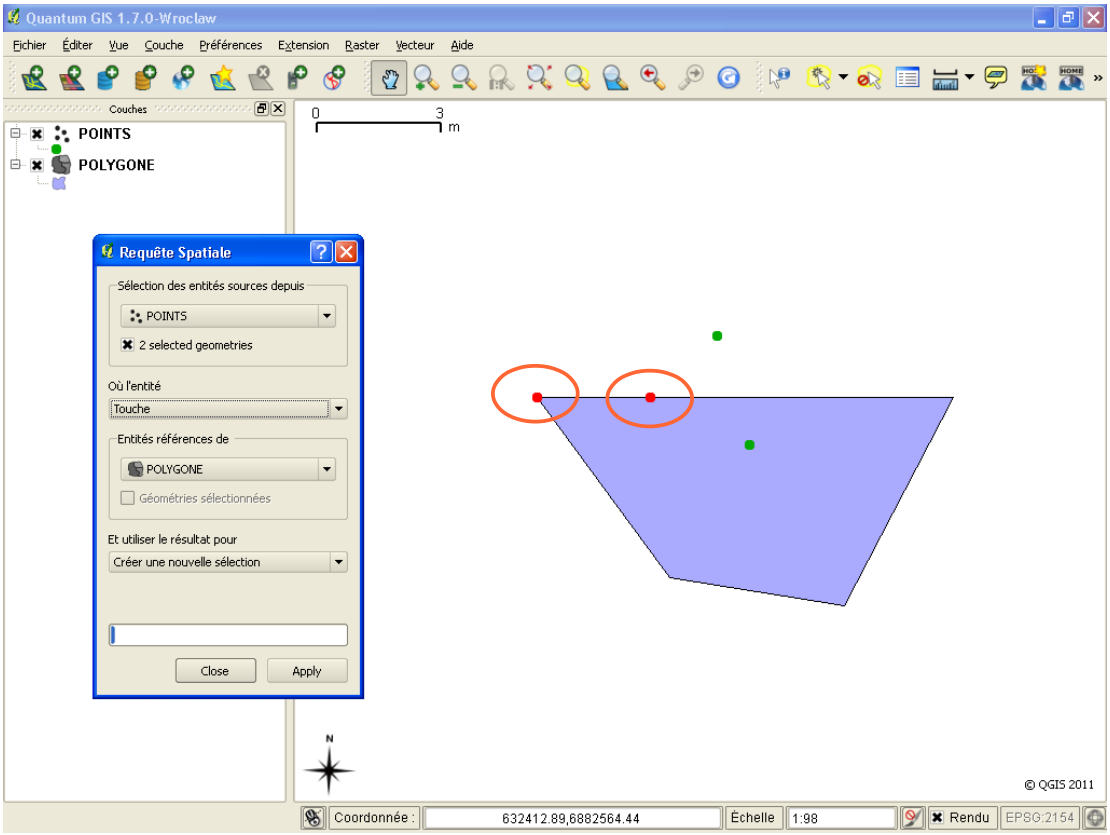


Avec Intersects : résultat identique

Disjoint (n'existe pas dans MapInfo®)

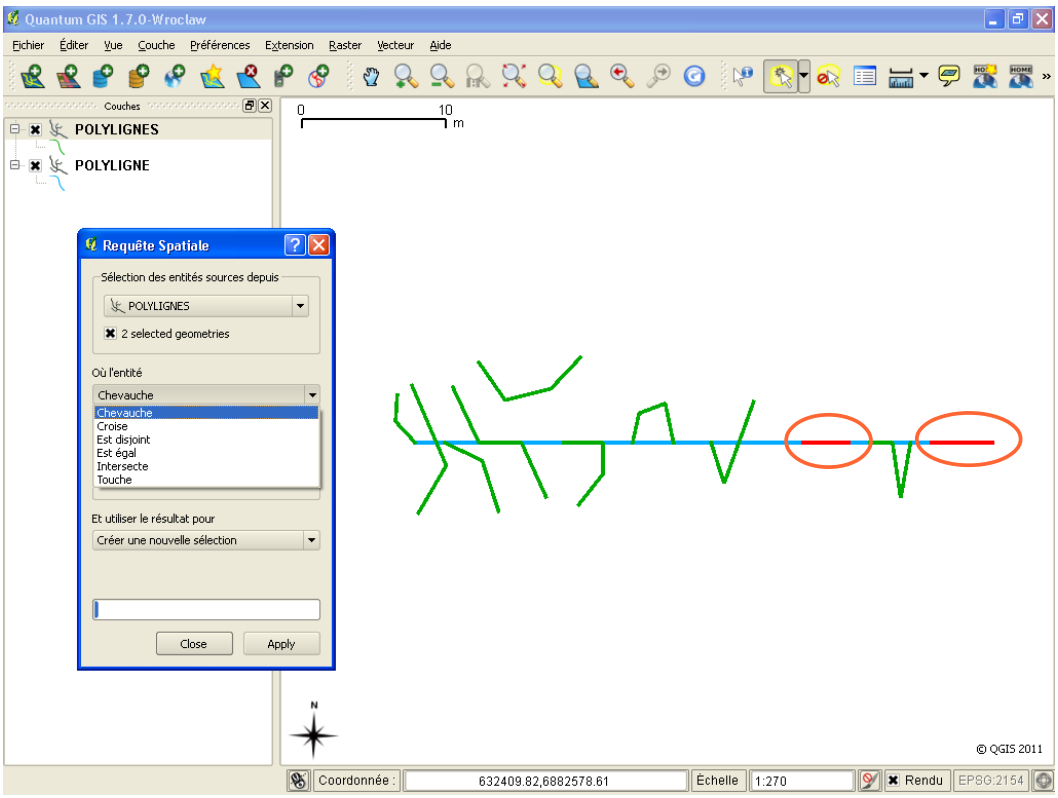


Touches (n'existe pas dans MapInfo®)

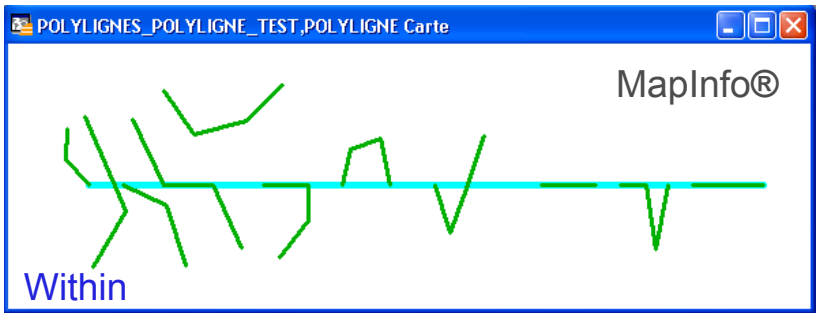


Relations polylignes-polylignes

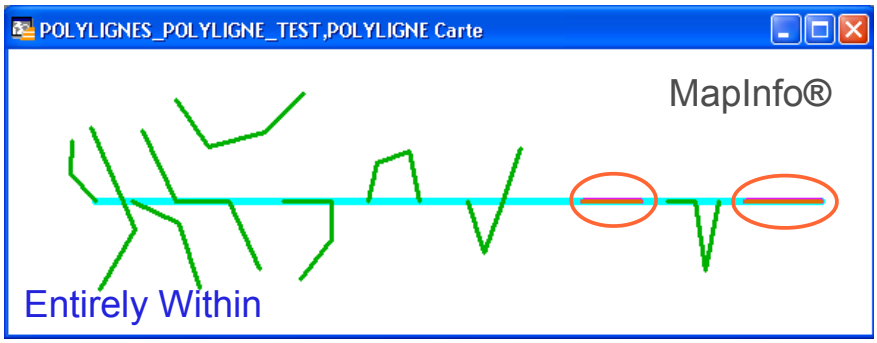
Within



Dans la version 1.7 de QGIS, l'outil de requête spatiale polyligne/polyligne ne comprend pas le prédicat Within
Résultat obtenu en appliquant la relation topologique Within OGC

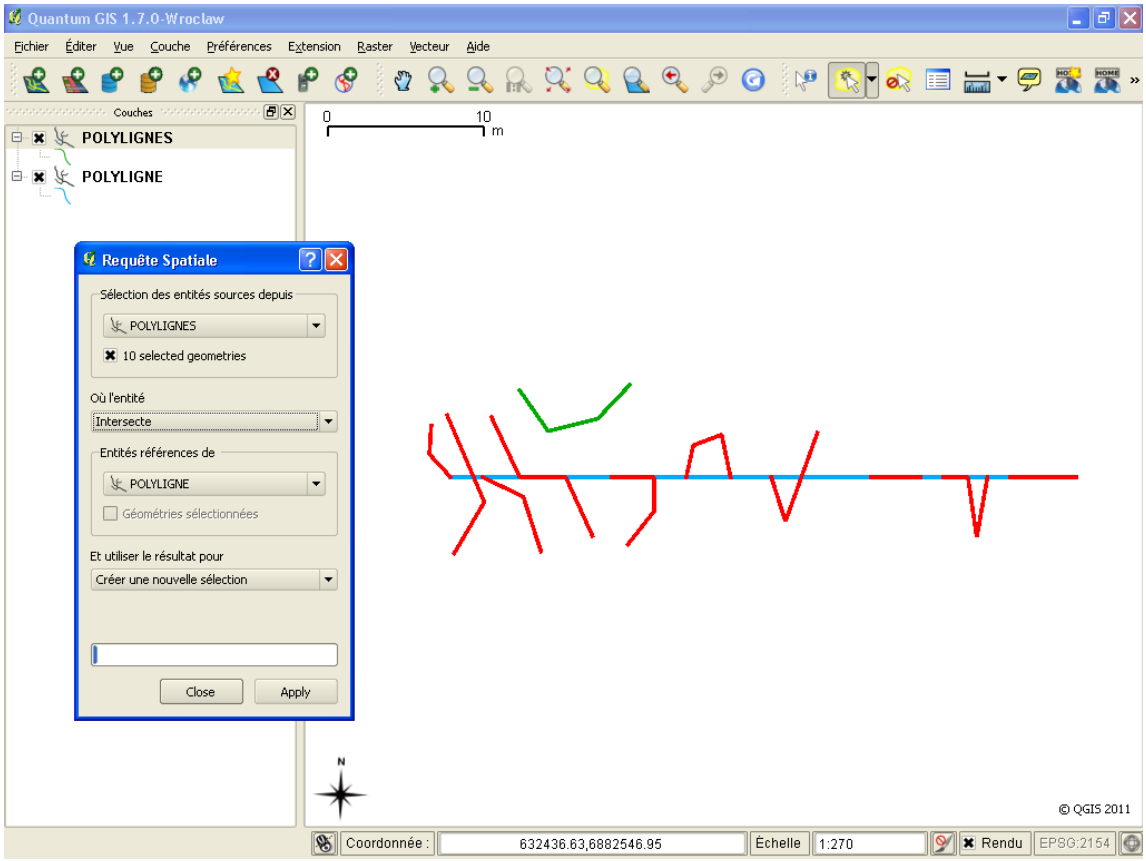


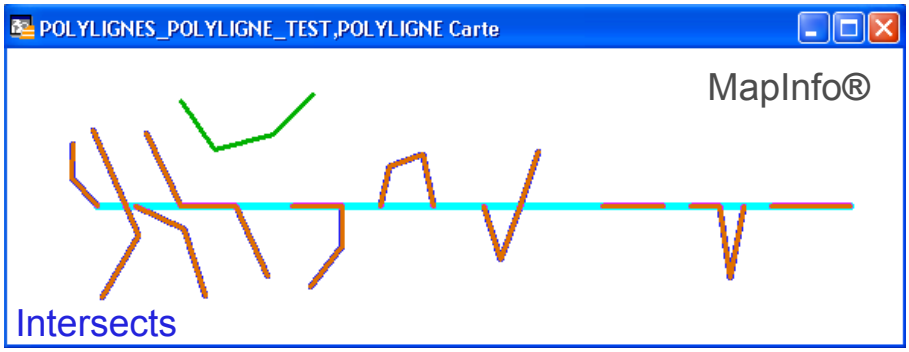
Avec Within : résultat différent



Avec Entirely Within : résultat identique

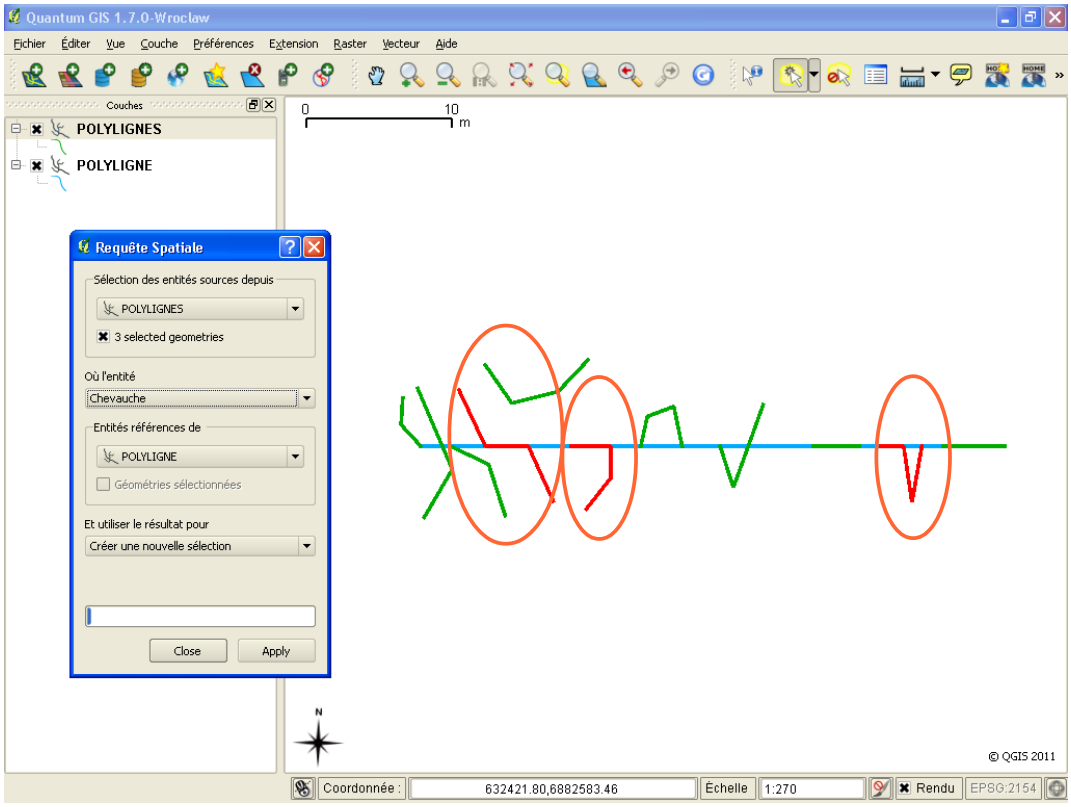
Intersects



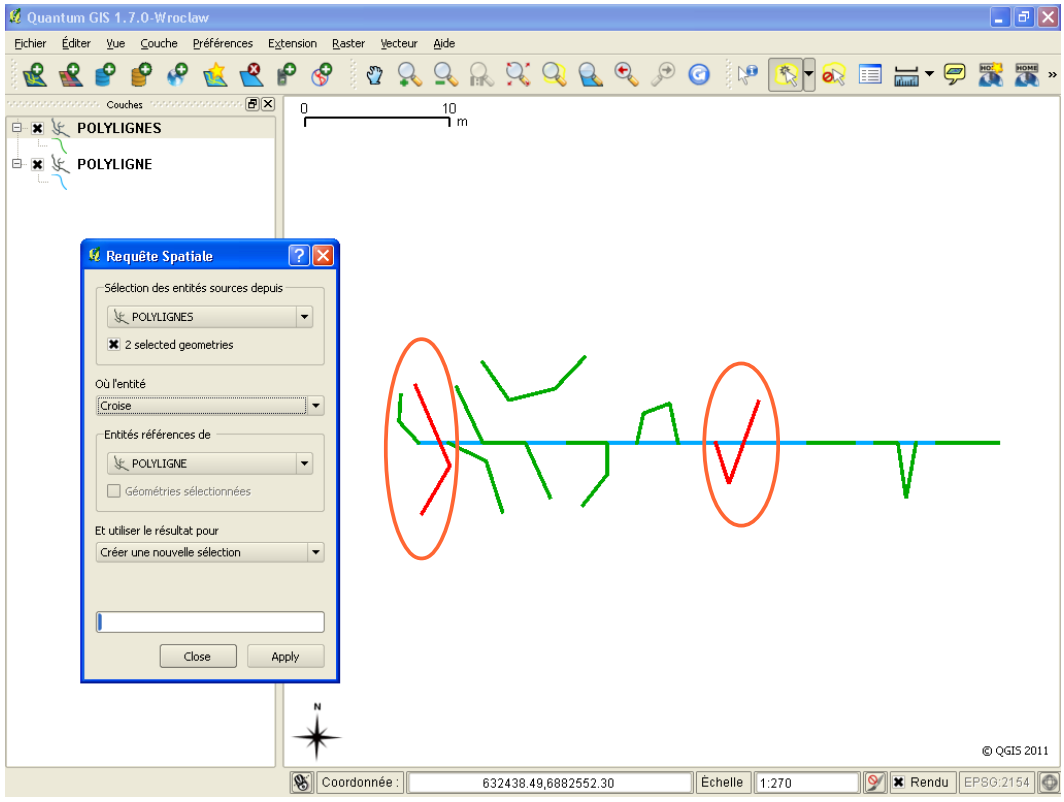


Avec Intersects : résultat identique

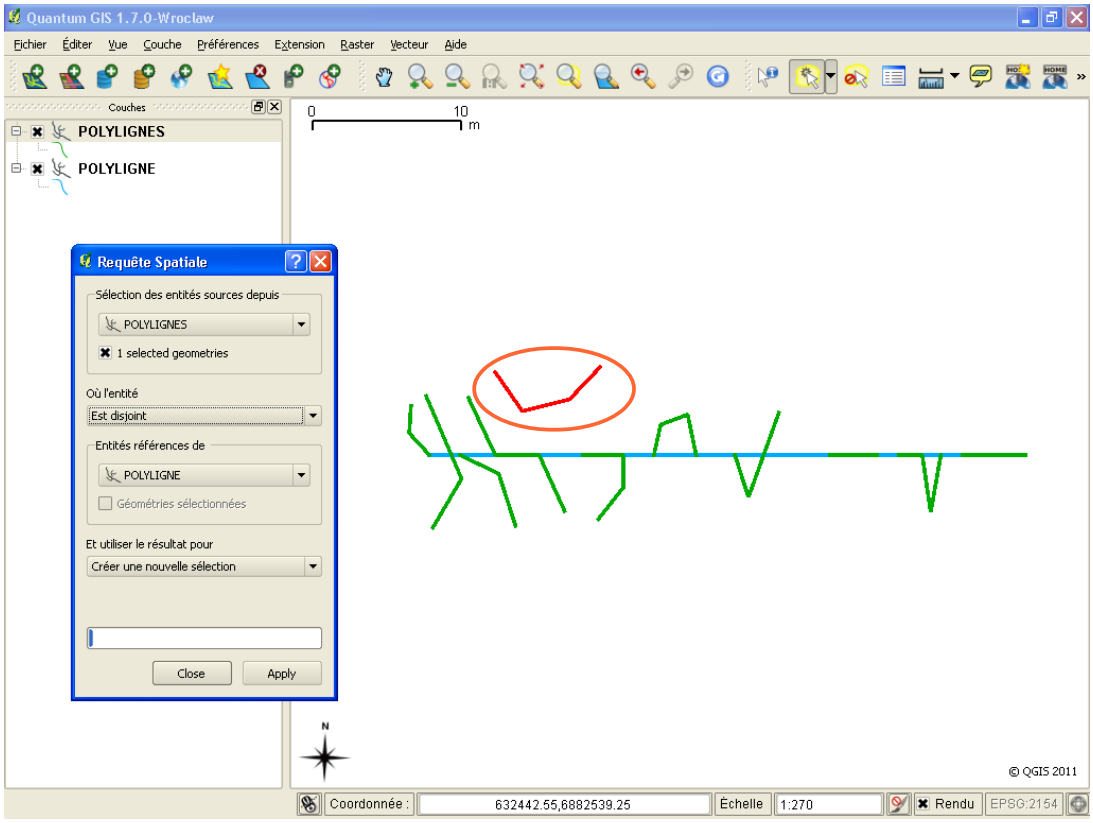
Overlaps (n'existe pas dans MapInfo®)



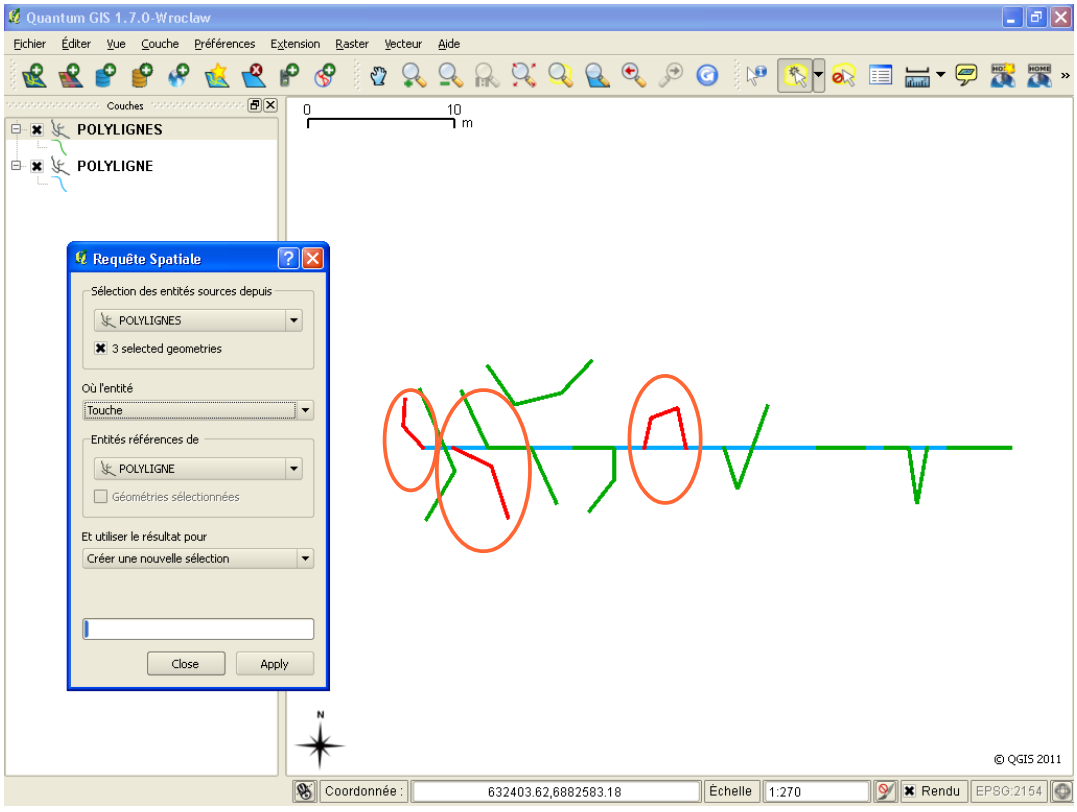
Crosses (n'existe pas dans MapInfo®)



Disjoint (n'existe pas dans MapInfo®)

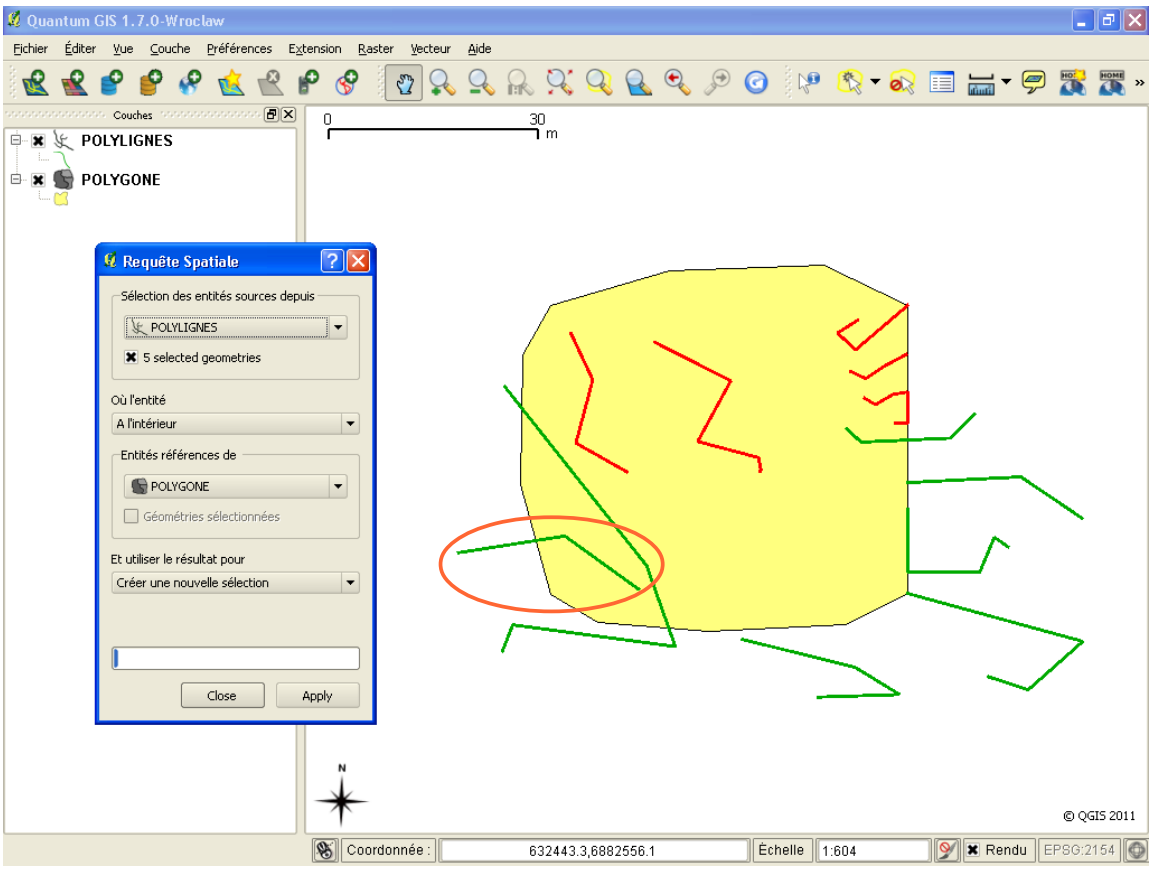


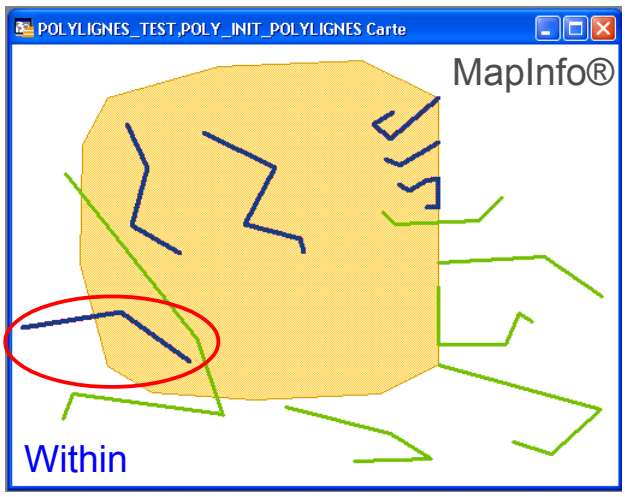
Touches (n'existe pas dans MapInfo®)



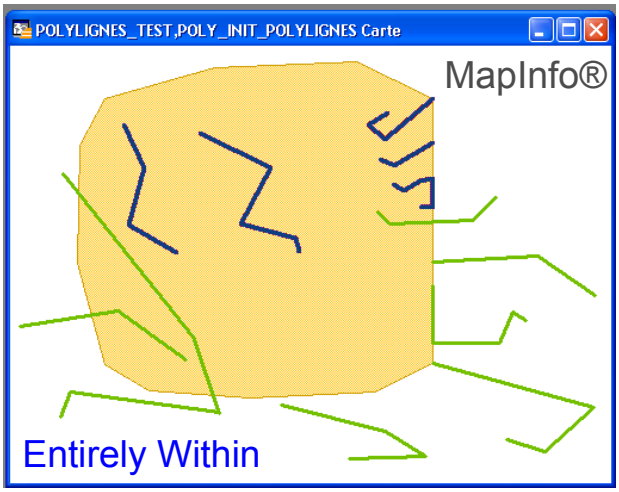
Relations polylignes-polygones

Within



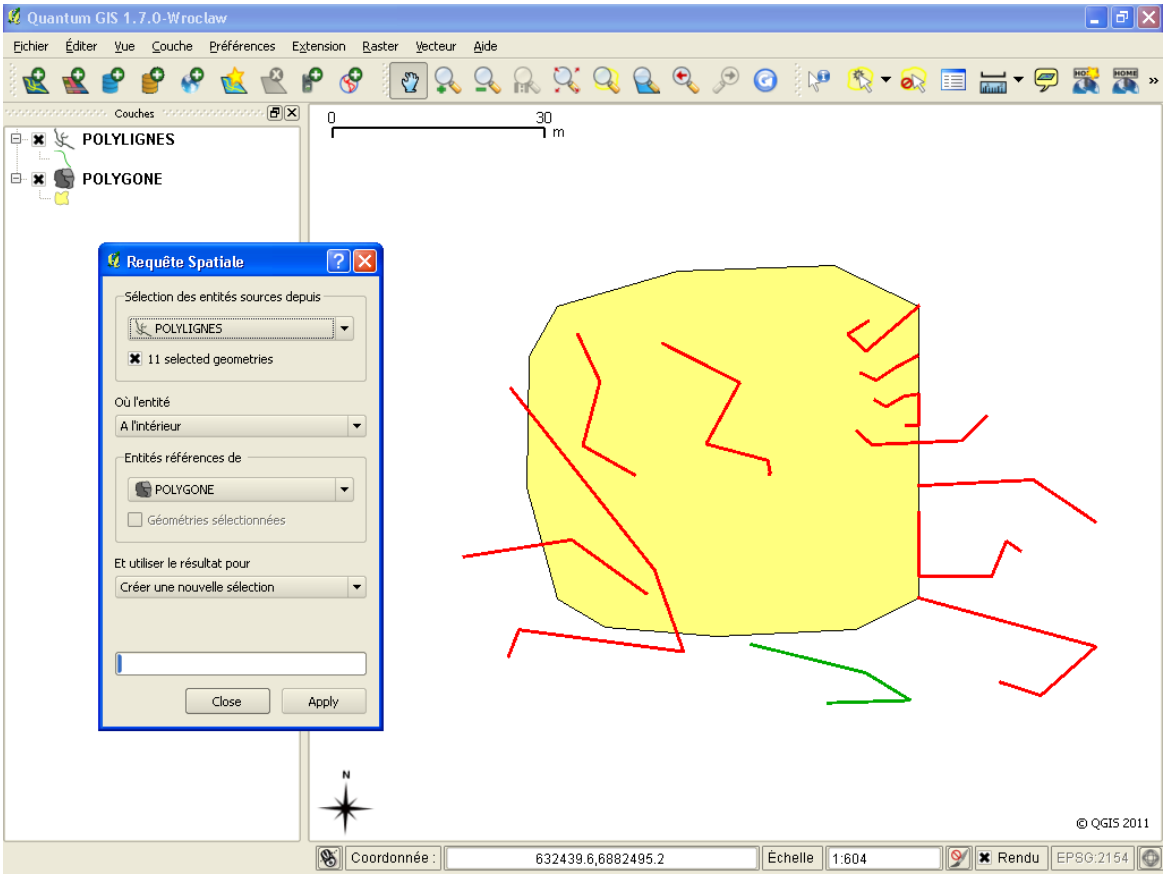


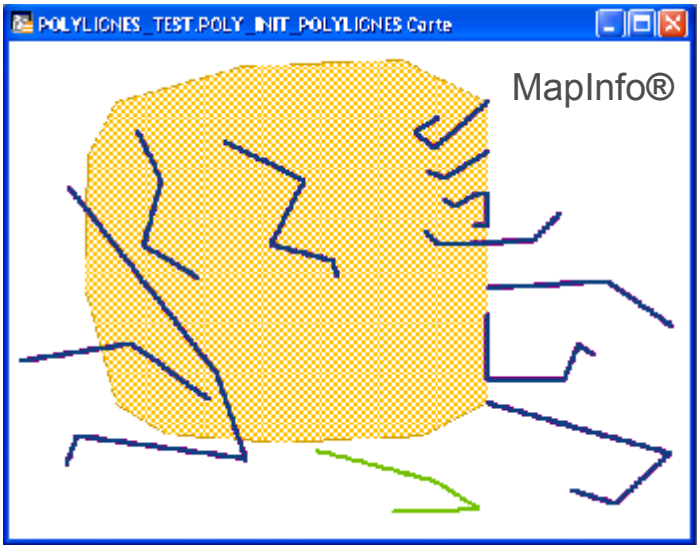
Avec Within : résultat différent



Avec Entirely Within : résultat identique

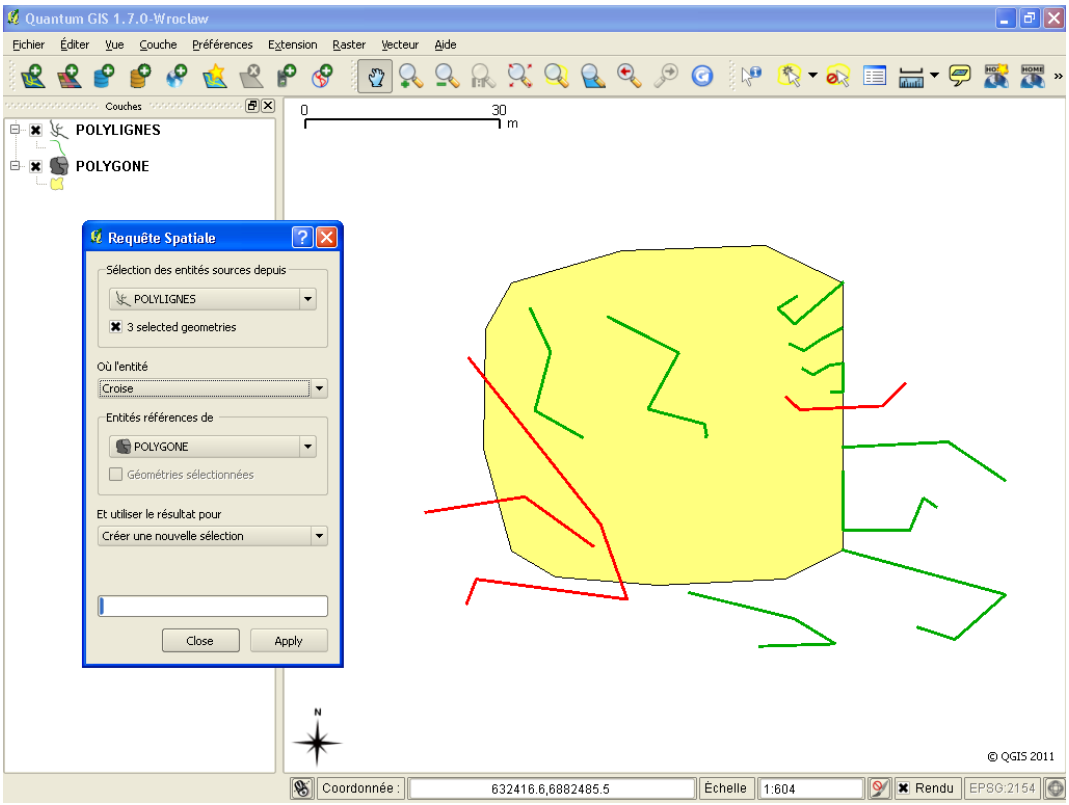
Intersects



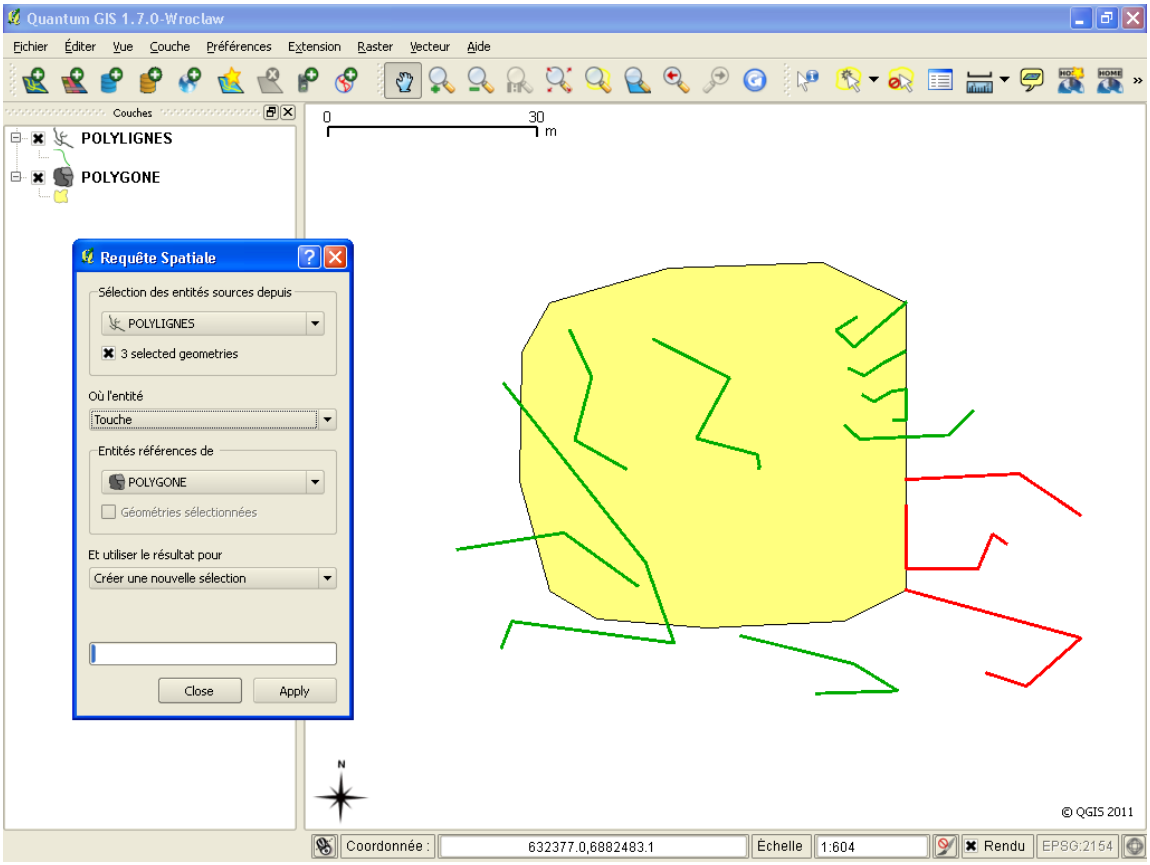


Avec Intersects : résultat identique

Crosses (n'existe pas dans MapInfo®)



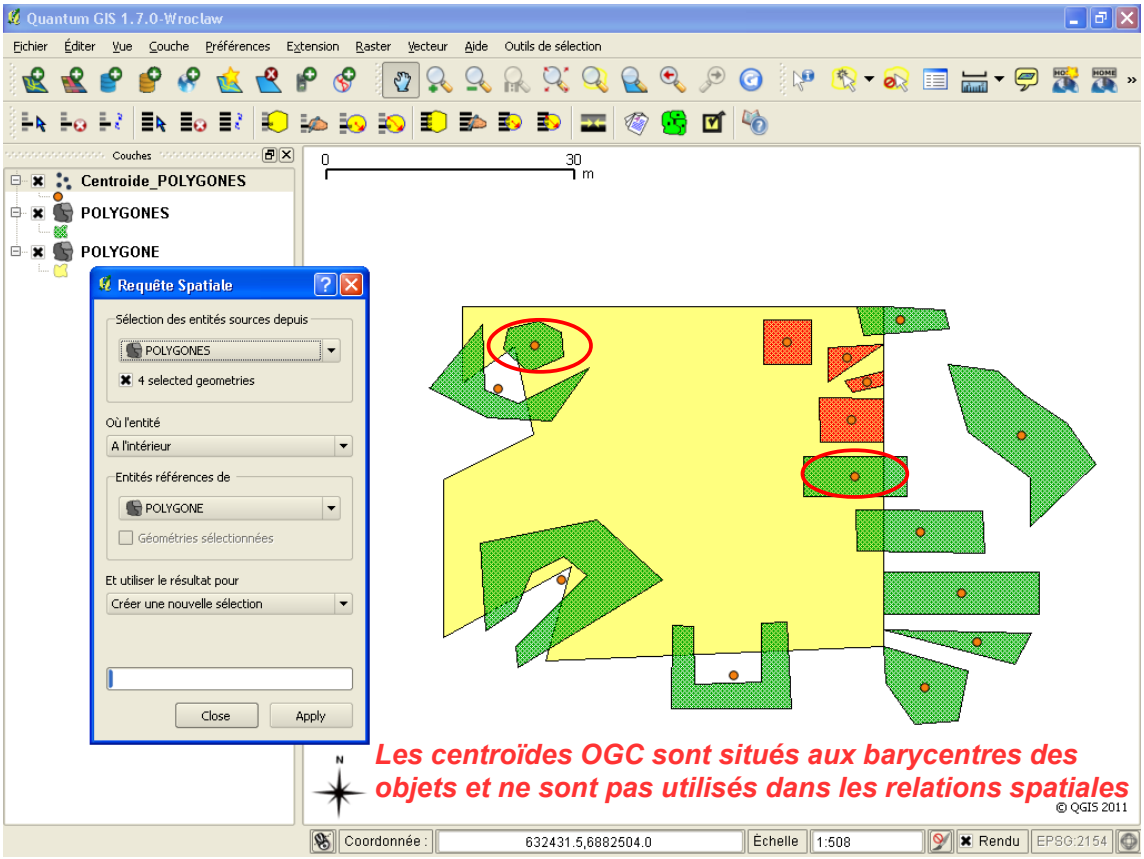
Touches (n'existe pas dans MapInfo®)



Relations polygones-polygones

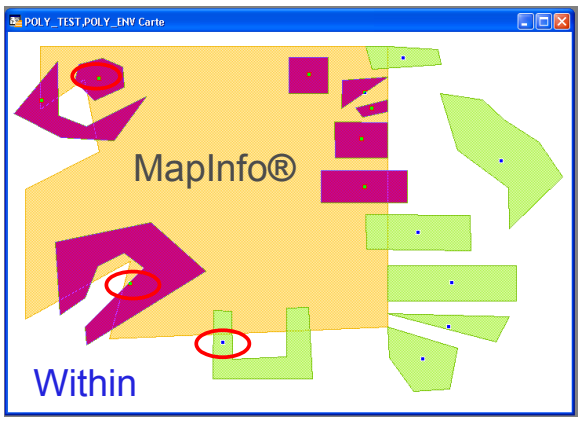
Les polygones tests sont situés dans deux couches (polygone jaune d'une part et polygones verts d'autre part). Ils représentent tous les cas de relations spatiales possibles entre polygones.

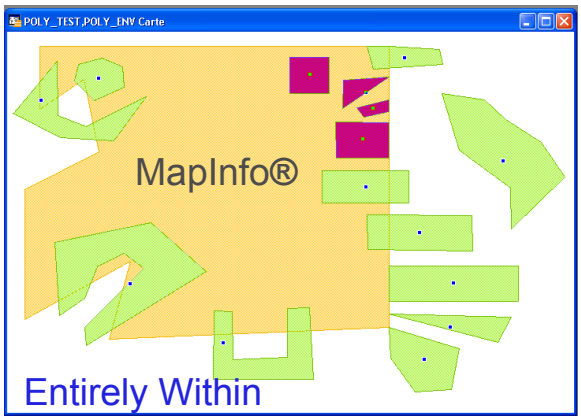
Within



Avec QGIS les polygones verts dont le centroïde est situé dans le polygone jaune mais qui ne sont pas complètement inclus dans celui-ci ne sont pas sélectionnés

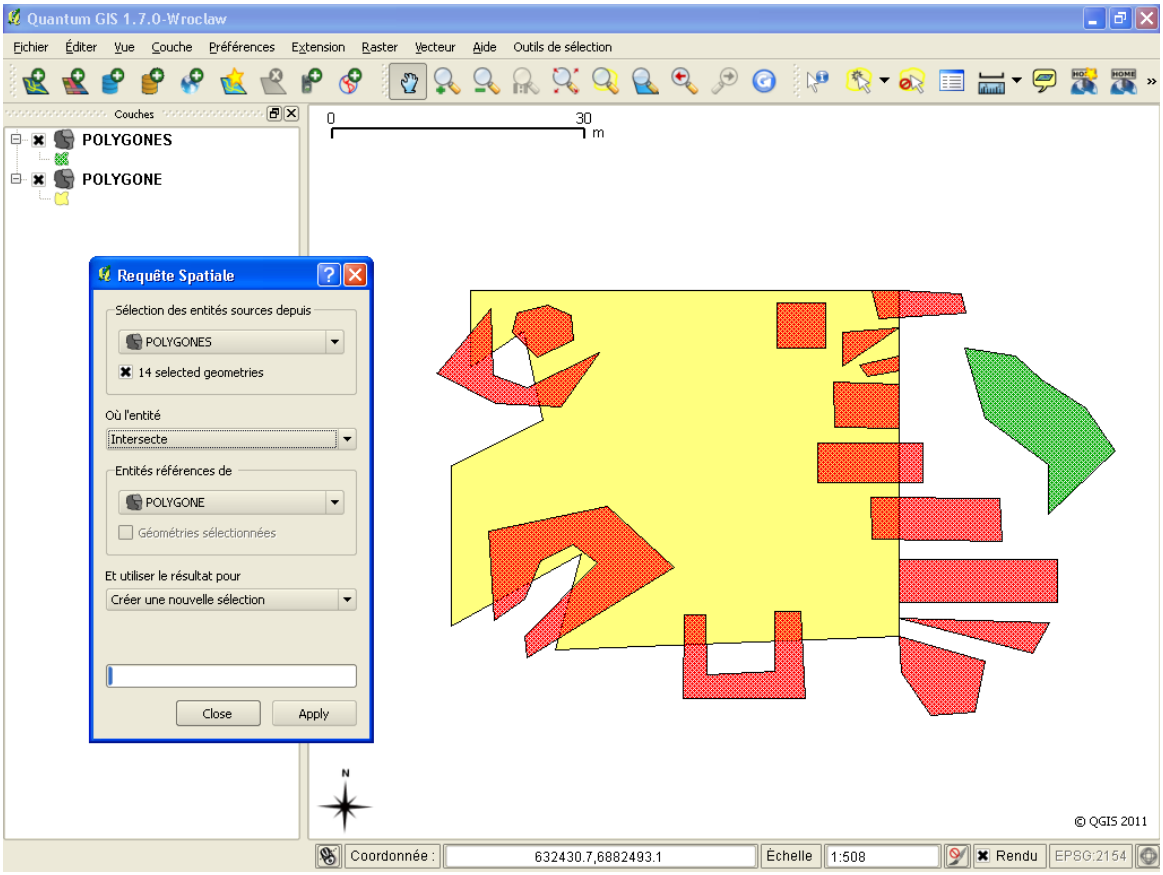
Les centroïdes dans Mapinfo® ne sont pas identiques à ceux de l'OGC :

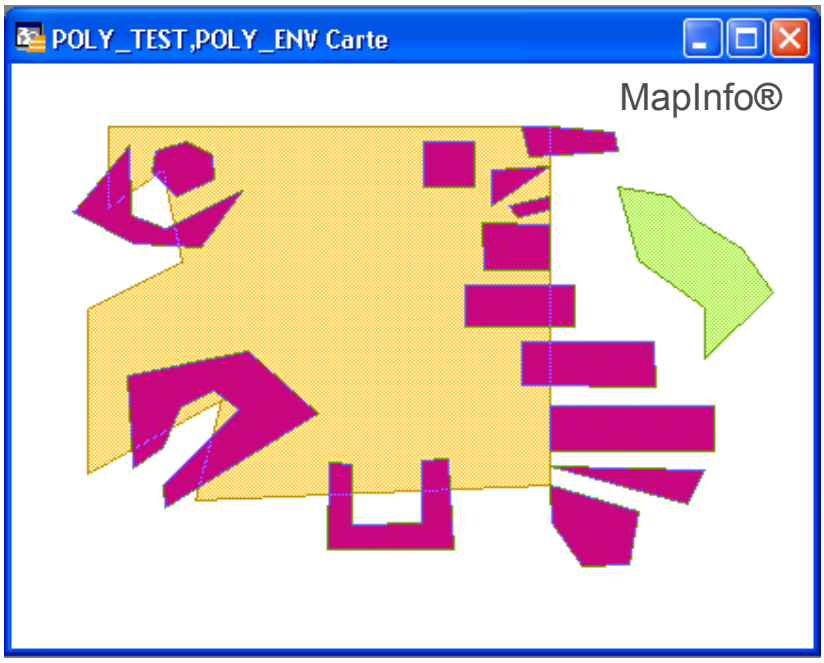




Avec Within : résultat différent **Avec Entirely Within : résultat identique**

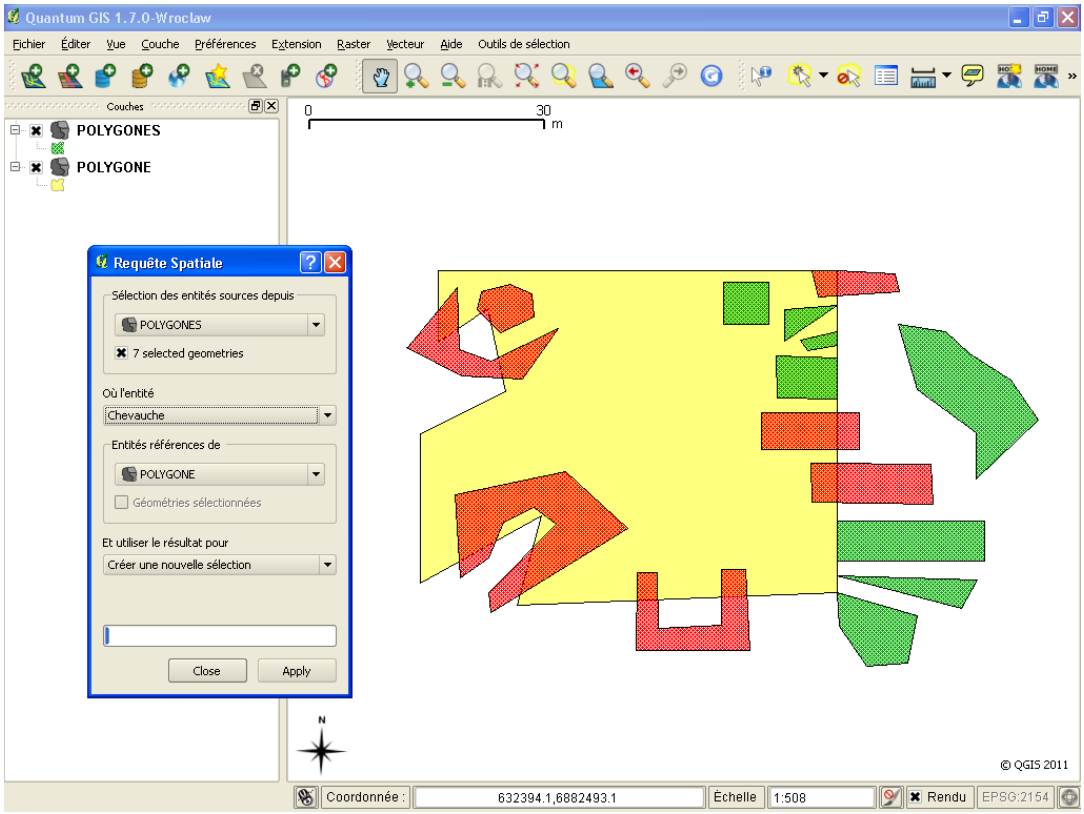
Intersects



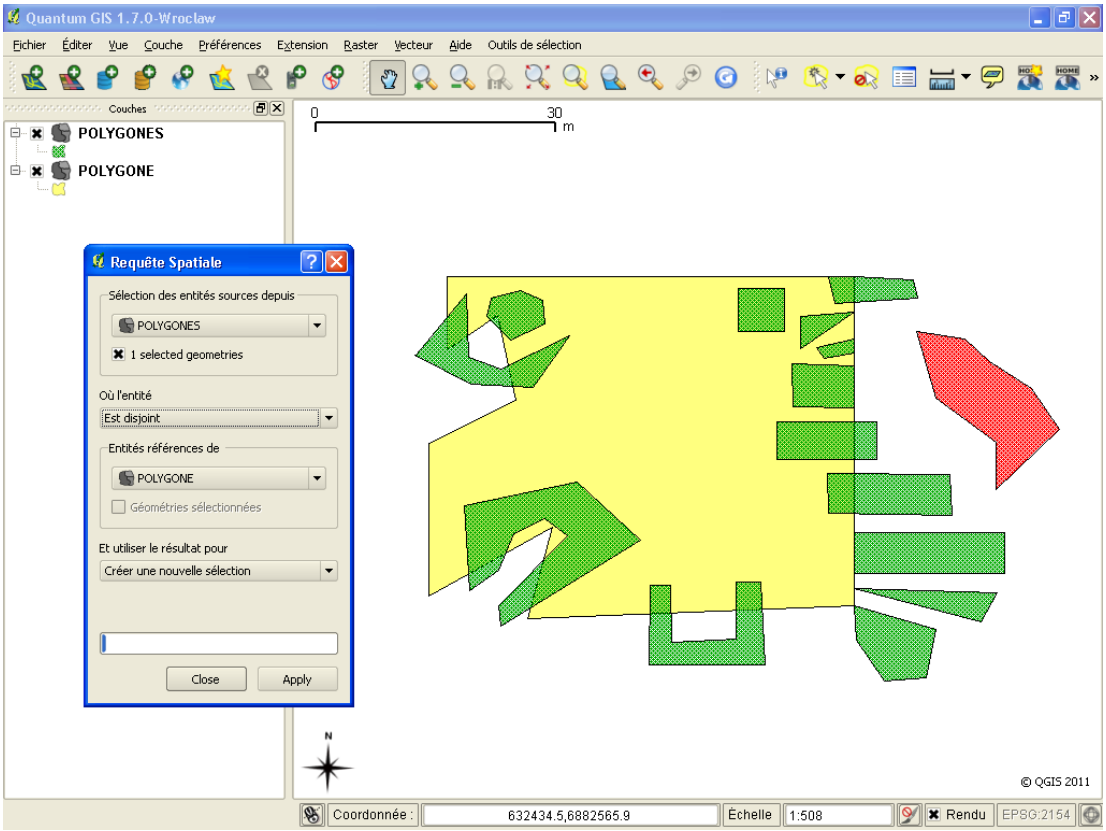


Avec Intersects : résultat identique

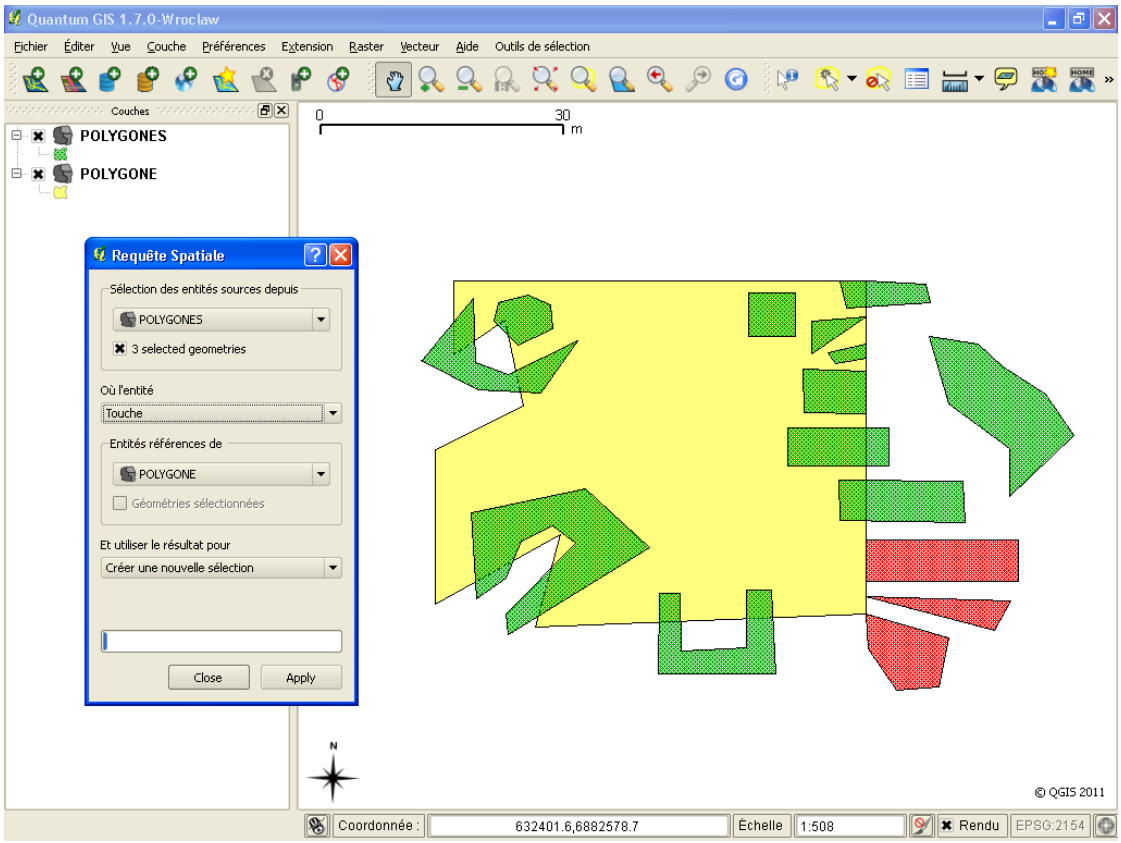
Overlaps (n'existe pas dans MapInfo®)



Disjoint (n'existe pas dans MapInfo®)

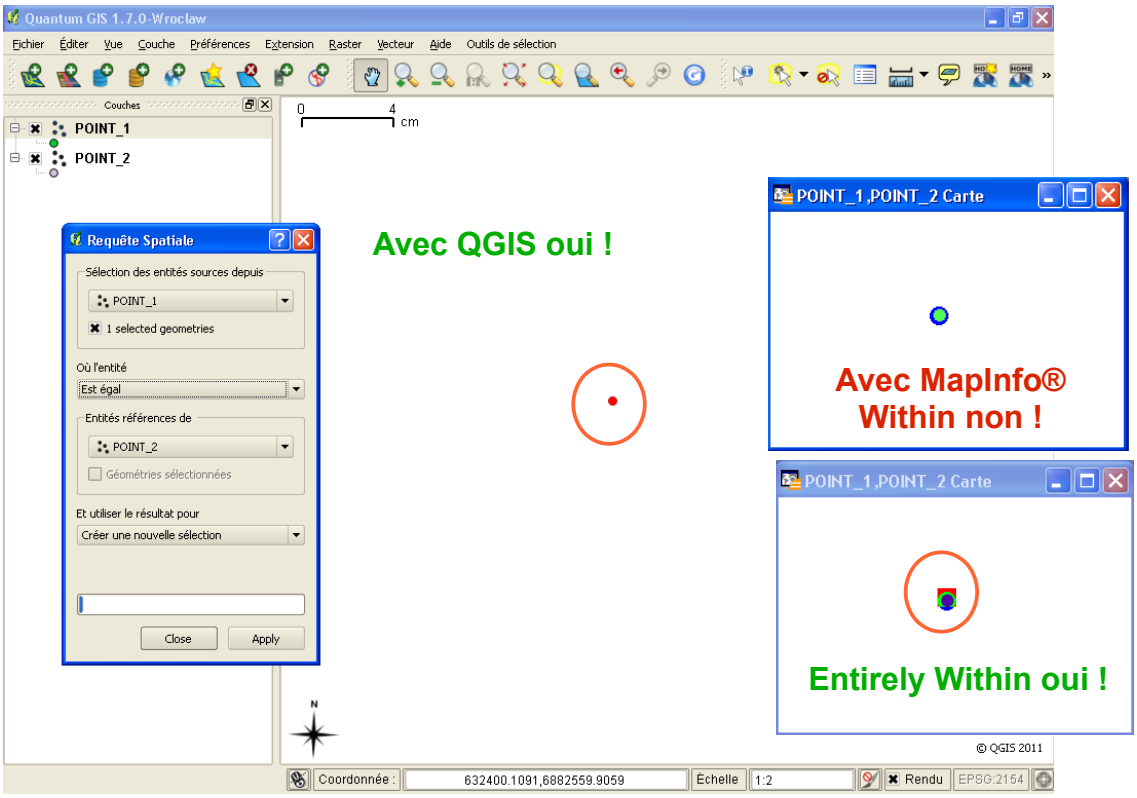


Touches (n'existe pas dans MapInfo®)

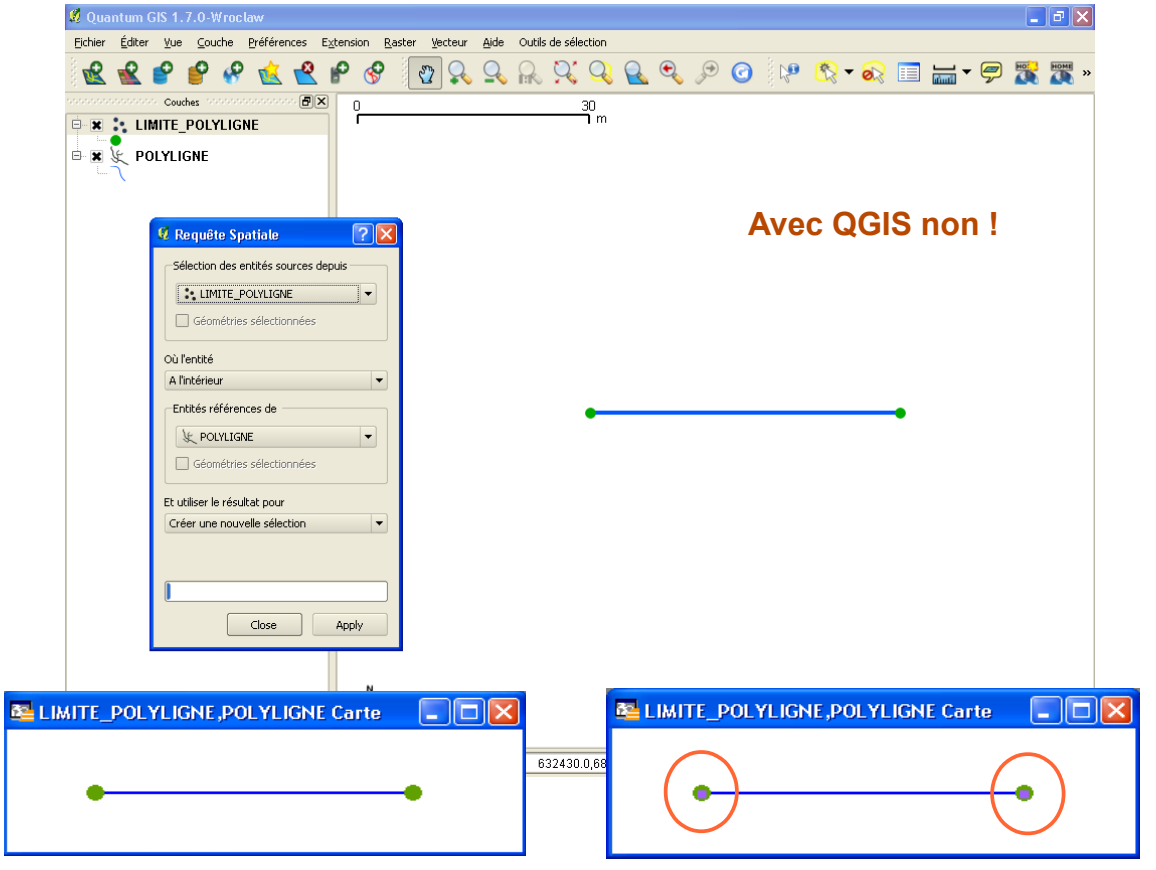


Trois exemples « d'effets de bord »

Un point se contient-il lui-même ?



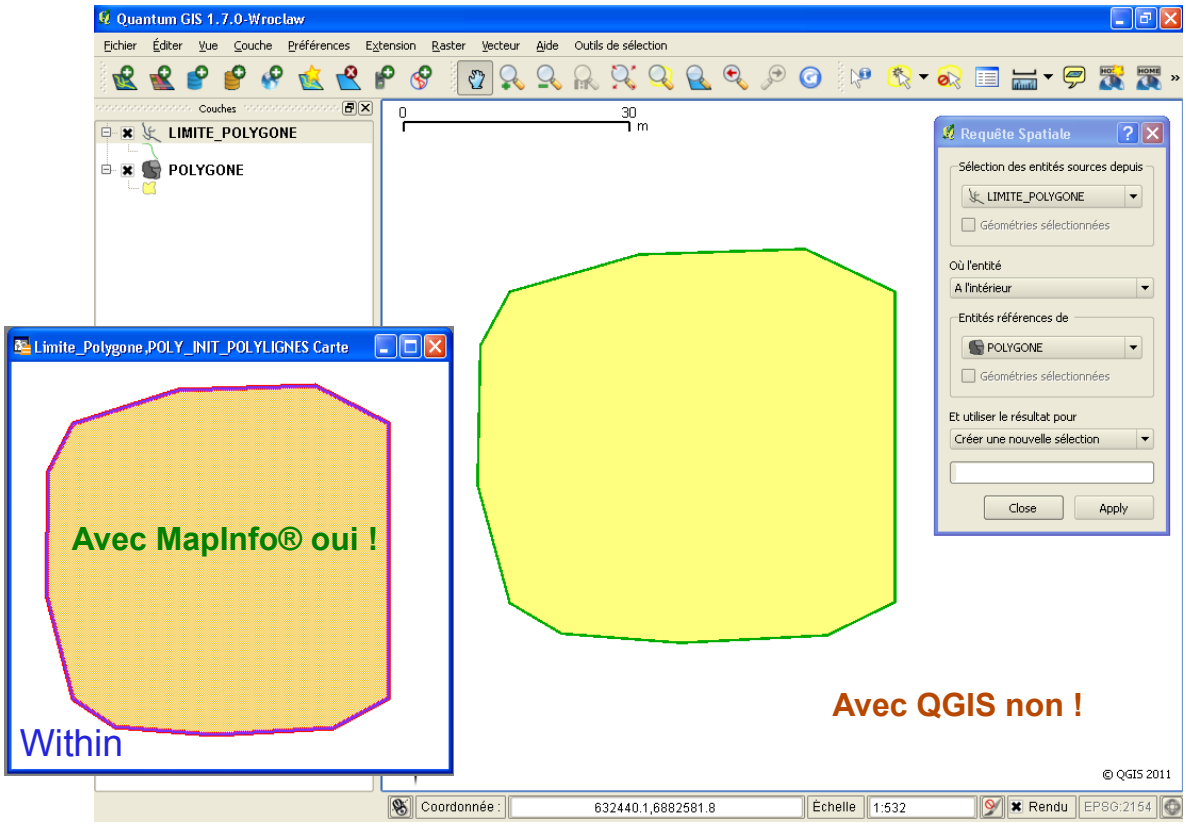
Une polyligne contient-elle sa propre limite ?



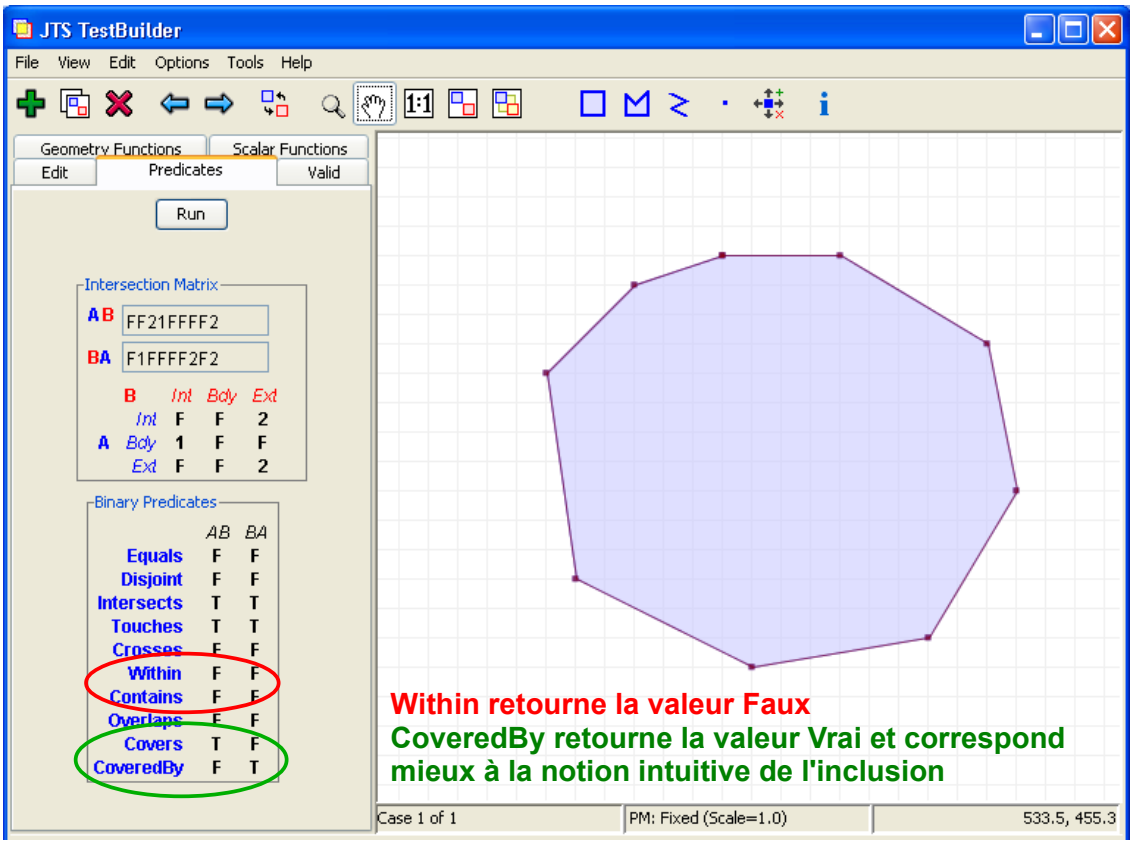
Avec MapInfo® Within non !

Avec MapInfo® Entirely Within oui !

Un polygone contient-il sa propre limite ?



La preuve par JTS :



5 - Inventaire des relations topologiques point, polyligne, polygone

Cet inventaire dresse la liste illustrée des 98 relations topologiques possibles entre objets géographiques simples de type ponctuel, linéaire et surfacique.

Puisque chaque intersection de la matrice peut prendre 4 valeurs différentes (F, 0, 1, 2) il existe potentiellement 4^9 combinaisons possibles soit 262144 matrices différentes !
Cependant toutes ne sont pas réalisables en raison des contraintes liées aux caractéristiques topologiques des objets (par exemple un point n'a pas de limite, donc les valeurs des intersections des objets avec la limite d'un point est toujours égale à F : ligne horizontale du milieu des matrices de la 1ère ligne ci-dessous) et celles s'appliquant aux relations d'intersection entre les intérieurs, les limites ou les extérieurs des objets.
Par exemple l'intersection des extérieurs des objets est toujours de dimension 2, aucun polygone ne couvrant totalement le plan. La 9ème cellule de la matrice d'intersection contient donc toujours la valeur 2.
Autre exemple de contrainte, si A et B sont 2 objets non ponctuels, la limite de A intersecte au moins une partie de B (intérieur, limite ou extérieur) et réciproquement. Ainsi, les matrices dont les lignes du milieu, horizontales ou verticales, ne contiennent que des valeurs F ne peuvent exister.
La liste des relations point/point (P/P), point/polyligne (P/L) et point/polygone (P/S) est évidente.
Les relations existant réellement entre polyligne/polyligne (L/L), polyligne/polygone (L/S) et polygone/polygone (S/S) ont été déduites de l'ensemble des relations possibles entre les objets en appliquant les contraintes topologiques décrites par Max J. Egenhofer et en considérant la dimension des intersections (modèle DE-9IM).
L'expression des contraintes liées à la topologie des objets est illustrée par les matrices d'intersection ci-dessous :

P/P

F, 0	F	F, 0
F	F	F
F, 0	F	2

P/L

F, 0	F, 0	F, 0
F	F	F
1	0	2

P/S

F, 0	F, 0	F, 0
F	F	F
2	1	2

L/P

F, 0	F	1
F, 0	F	0
F, 0	F	2

L/L

F, 0, 1	F, 0	F, 1
F, 0	F, 0	F, 0
F, 1	F, 0	2

L/S

F, 1	F, 0, 1	F, 1
F, 0	F, 0	F, 0
2	1	2

S/P

F, 0	F	2
F, 0	F	1
F, 0	F	2

S/L

F, 1	F, 0	2
F, 0, 1	F, 0	1
F, 1	F, 0	2

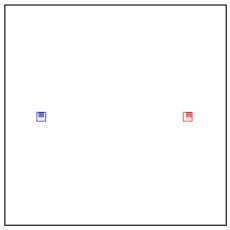
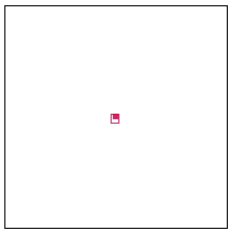
S/S

F, 2	F, 1	F, 2
F, 1	F, 0, 1	F, 1
F, 2	F, 1	2

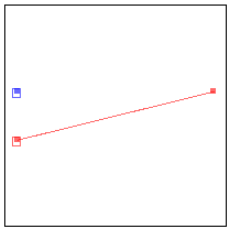
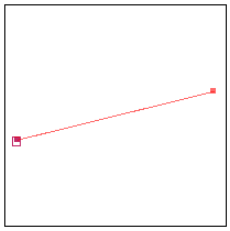
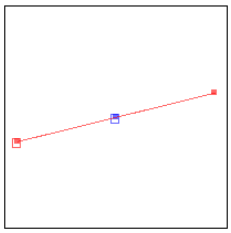
Pour chaque matrice, les combinaisons des valeurs d'intersection ne correspondent pas toutes à des relations topologiques réelles.

Pour chaque relation sont présentés le schéma géométrique, la matrice d'intersection, le caractère symétrique de la matrice (commutativité de la relation topologique) et la valeur retournée par les prédicats.

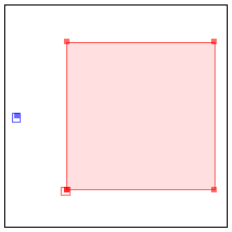
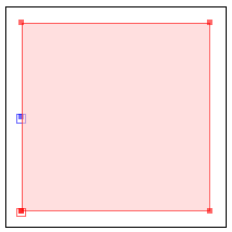
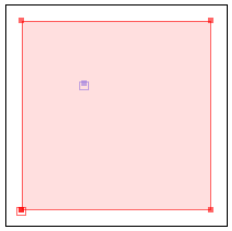
Point / Point (2 relations)

Schéma	Matrice	Symétrie	Prédicats
	Intersection Matrix AB FF0FFF0F2 BA FF0FFF0F2 B Int Bdy Ext Int F F 0 A Bdy F F F Ext 0 F 2	OUI	Binary Predicates AB BA Equals F F Disjoint T T Intersects F F Touches F F Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 0FFFFFFF2 BA 0FFFFFFF2 B Int Bdy Ext Int 0 F F A Bdy F F F Ext F F 2	OUI	Binary Predicates AB BA Equals T T Disjoint F F Intersects T T Touches F F Crosses F F Within T T Contains T T Overlaps F F Covers T T CoveredBy T T

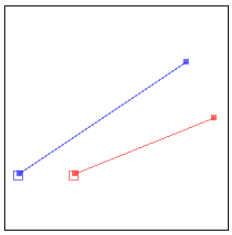
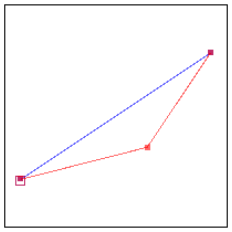
Point / Polyligne (3 relations)

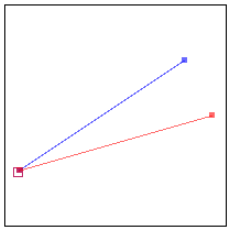
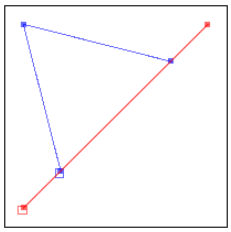
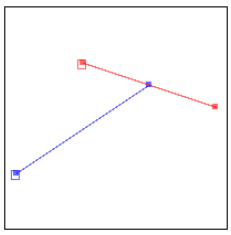
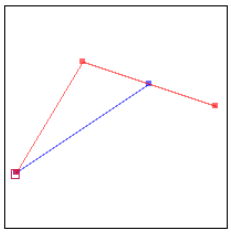
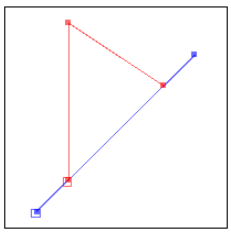
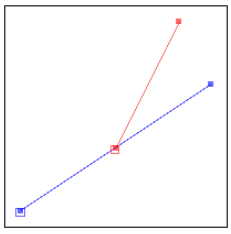
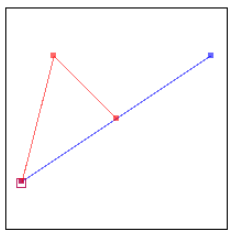
Schéma	Matrice	Symétrie	Prédicats
	Intersection Matrix AB FF0FFF102 BA FF1FF00F2 B Int Bdy Ext Int F F 0 A Bdy F F F Ext 1 0 2	NON	Binary Predicates AB BA Equals F F Disjoint T T Intersects F F Touches F F Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB F0FFF102 BA FF10F0FF2 B Int Bdy Ext Int F 0 F A Bdy F F F Ext 1 0 2	NON	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F T CoveredBy T F
	Intersection Matrix AB 0FFFFF102 BA 0F1FF0FF2 B Int Bdy Ext Int 0 F F A Bdy F F F Ext 1 0 2	NON	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within T F Contains F T Overlaps F F Covers F T CoveredBy T F

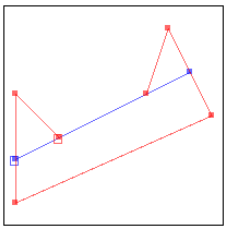
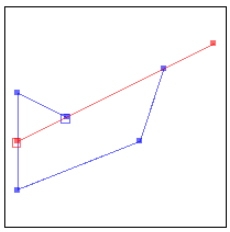
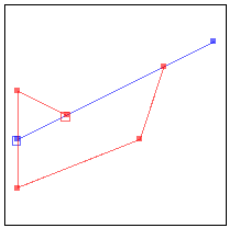
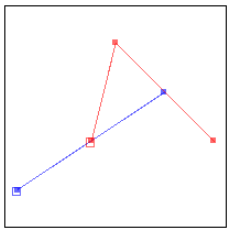
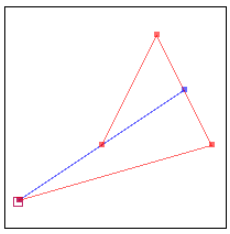
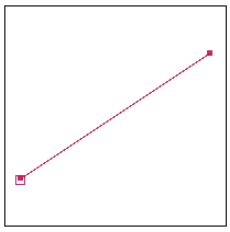
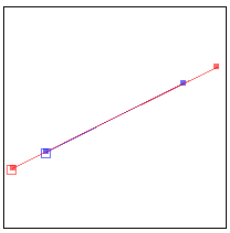
Point / Polygone (3 relations)

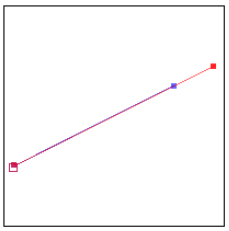
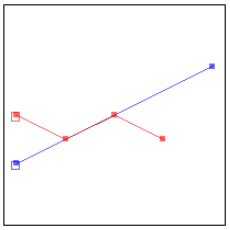
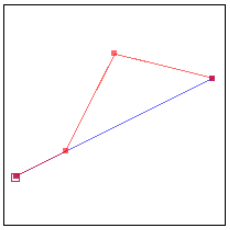
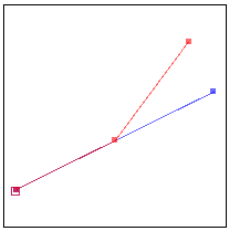
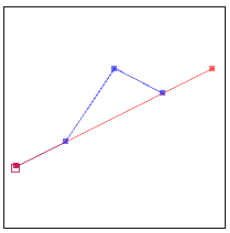
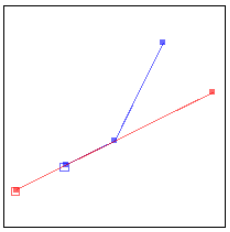
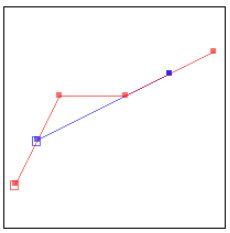
Schéma	Matrice	Symétrie	Prédicats
	Intersection Matrix AB FF0FFF212 BA FF2FF10F2 B Int Bdy Ext Int F F 0 A Bdy F F F Ext 2 1 2	NON	Binary Predicates AB BA Equals F F Disjoint T T Intersects F F Touches F F Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB F0FFF212 BA FF20F1FF2 B Int Bdy Ext Int F 0 F A Bdy F F F Ext 2 1 2	NON	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F T CoveredBy T F
	Intersection Matrix AB 0FFFFF212 BA 0F2FF1FF2 B Int Bdy Ext Int 0 F F A Bdy F F F Ext 2 1 2	NON	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within T F Contains F T Overlaps F F Covers F T CoveredBy T F

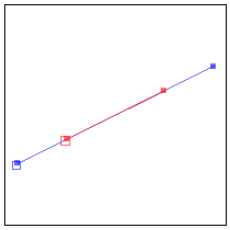
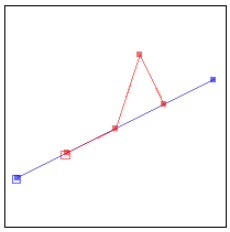
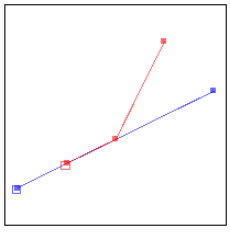
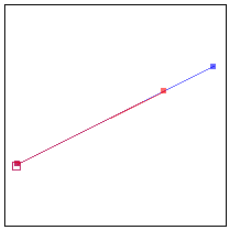
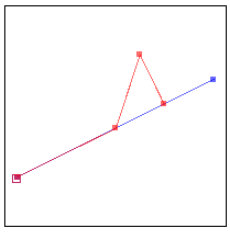
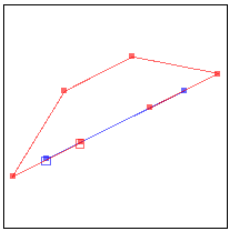
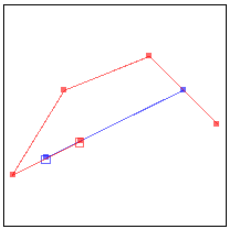
Polyligne / Polyligne (47 relations)

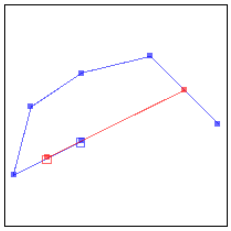
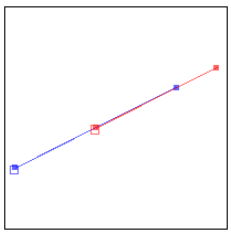
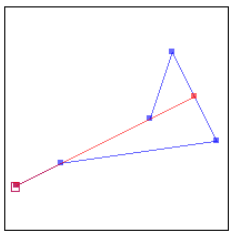
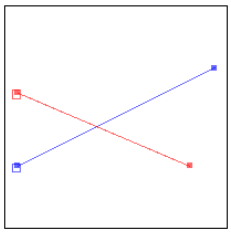
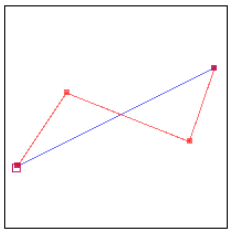
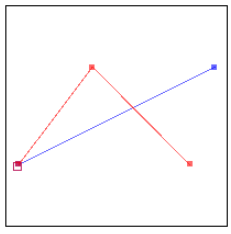
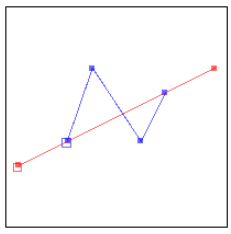
Schéma	Matrice	Symétrie	Prédicats
	Intersection Matrix AB FF1FF0102 BA FF1FF0102 B Int Bdy Ext Int F F 1 A Bdy F F 0 Ext 1 0 2	OUI	Binary Predicates AB BA Equals F F Disjoint T T Intersects F F Touches F F Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB FF1F0F1F2 BA FF1F0F1F2 B Int Bdy Ext Int F F 1 A Bdy F 0 F Ext 1 F 2	OUI	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F

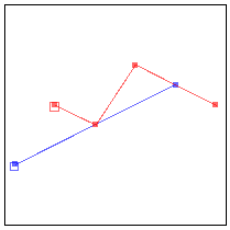
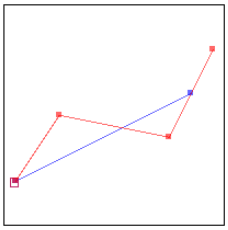
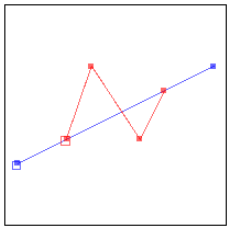
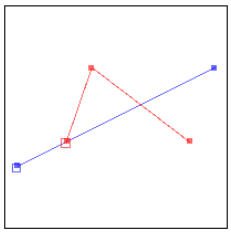
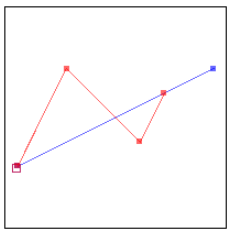
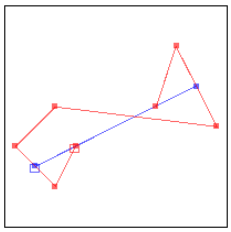
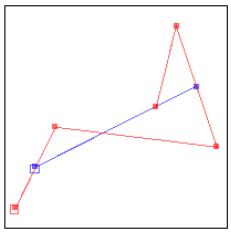
	Intersection Matrix AB FF1F00102 BA FF1F00102 B Int Bdy Ext Int F F 1 A Bdy F 0 0 Ext 1 0 2	**OUI**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB FF10FF102 BA F01FF01F2 B Int Bdy Ext Int F F 1 A Bdy 0 F F Ext 1 0 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB FF10F0102 BA F01FF0102 B Int Bdy Ext Int F F 1 A Bdy 0 F 0 Ext 1 0 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB FF100F102 BA F01F001F2 B Int Bdy Ext Int F F 1 A Bdy 0 0 F Ext 1 0 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB F01FF01F2 BA FF10FF102 B Int Bdy Ext Int F 0 1 A Bdy F F 0 Ext 1 F 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB F01FF0102 BA FF10F0102 B Int Bdy Ext Int F 0 1 A Bdy F F 0 Ext 1 0 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB F01F001F2 BA FF100F102 B Int Bdy Ext Int F 0 1 A Bdy F 0 0 Ext 1 F 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F

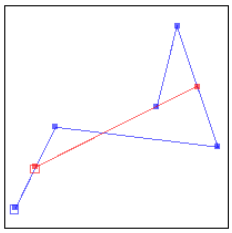
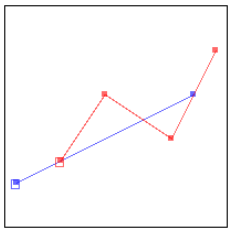
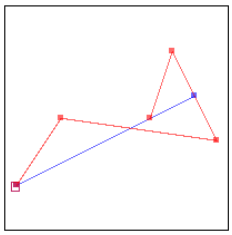
	Intersection Matrix AB F010FF1F2 BA F010FF1F2 B Int Bdy Ext Int F 0 1 A Bdy 0 F F Ext 1 F 2	**OUI**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB F010FF102 BA F010F01F2 B Int Bdy Ext Int F 0 1 A Bdy 0 F F Ext 1 0 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB F010F01F2 BA F010FF102 B Int Bdy Ext Int F 0 1 A Bdy 0 F 0 Ext 1 F 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB F010F0102 BA F010F0102 B Int Bdy Ext Int F 0 1 A Bdy 0 F 0 Ext 1 0 2	**OUI**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB F0100F1F2 BA F0100F1F2 B Int Bdy Ext Int F 0 1 A Bdy 0 0 F Ext 1 F 2	**OUI**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 1FFF0FFF2 BA 1FFF0FFF2 B Int Bdy Ext Int 1 F F A Bdy F 0 F Ext F F 2	**OUI**	Binary Predicates AB BA Equals T T Disjoint F F Intersects T T Touches F F Crosses F F Within T T Contains T T Overlaps F F Covers T T CoveredBy T T
	Intersection Matrix AB 1FF0FF102 BA 101FF0FF2 B Int Bdy Ext Int 1 F F A Bdy 0 F F Ext 1 0 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within T F Contains F T Overlaps F F Covers F T CoveredBy T F

	Intersection Matrix AB 1FF00F102 BA 101F00FF2 B Int Bdy Ext Int 1 F F A Bdy 0 0 F Ext 1 0 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within T F Contains F T Overlaps F F Covers F T CoveredBy T F
	Intersection Matrix AB 1F1FF0102 BA 1F1FF0102 B Int Bdy Ext Int 1 F 1 A Bdy F F 0 Ext 1 0 2	**OUI**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F F Contains F F Overlaps T T Covers F F CoveredBy F F
	Intersection Matrix AB 1F1F0F1F2 BA 1F1F0F1F2 B Int Bdy Ext Int 1 F 1 A Bdy F 0 F Ext 1 F 2	**OUI**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F F Contains F F Overlaps T T Covers F F CoveredBy F F
	Intersection Matrix AB 1F1F00102 BA 1F1F00102 B Int Bdy Ext Int 1 F 1 A Bdy F 0 0 Ext 1 0 2	**OUI**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F F Contains F F Overlaps T T Covers F F CoveredBy F F
	Intersection Matrix AB 1F100F102 BA 101F001F2 B Int Bdy Ext Int 1 F 1 A Bdy 0 0 F Ext 1 0 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F F Contains F F Overlaps T T Covers F F CoveredBy F F
	Intersection Matrix AB 1F10F0102 BA 101FF0102 B Int Bdy Ext Int 1 F 1 A Bdy 0 F 0 Ext 1 0 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F F Contains F F Overlaps T T Covers F F CoveredBy F F
	Intersection Matrix AB 1F10FF102 BA 101FF01F2 B Int Bdy Ext Int 1 F 1 A Bdy 0 F F Ext 1 0 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F F Contains F F Overlaps T T Covers F F CoveredBy F F

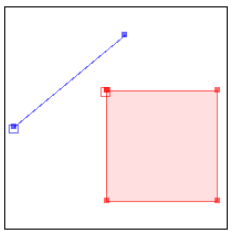
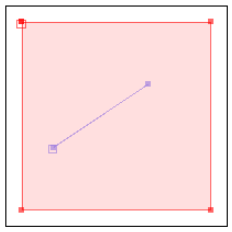
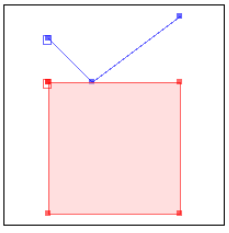
	Intersection Matrix AB 101FF0FF2 BA 1FF0FF102 B Int Bdy Ext Int 1 0 1 A Bdy F F 0 Ext F F 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F T Contains T F Overlaps F F Covers T F CoveredBy F T
	Intersection Matrix AB 101FF01F2 BA 1F10FF102 B Int Bdy Ext Int 1 0 1 A Bdy F F 0 Ext 1 F 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F F Contains F F Overlaps T T Covers F F CoveredBy F F
	Intersection Matrix AB 101FF0102 BA 1F10F0102 B Int Bdy Ext Int 1 0 1 A Bdy F F 0 Ext 1 0 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F F Contains F F Overlaps T T Covers F F CoveredBy F F
	Intersection Matrix AB 101F00FF2 BA 1FF00F102 B Int Bdy Ext Int 1 0 1 A Bdy F 0 0 Ext F F 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F T Contains T F Overlaps F F Covers T F CoveredBy F T
	Intersection Matrix AB 101F001F2 BA 1F100F102 B Int Bdy Ext Int 1 0 1 A Bdy F 0 0 Ext 1 F 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F F Contains F F Overlaps T T Covers F F CoveredBy F F
	Intersection Matrix AB 1010FF1F2 BA 1010FF1F2 B Int Bdy Ext Int 1 0 1 A Bdy 0 F F Ext 1 F 2	**OUI**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F F Contains F F Overlaps T T Covers F F CoveredBy F F
	Intersection Matrix AB 1010FF102 BA 1010F01F2 B Int Bdy Ext Int 1 0 1 A Bdy 0 F F Ext 1 0 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F F Contains F F Overlaps T T Covers F F CoveredBy F F

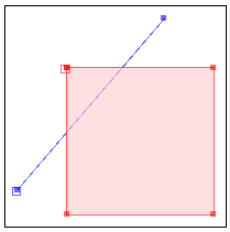
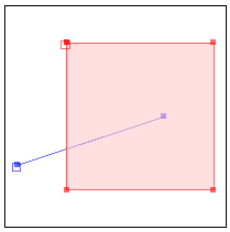
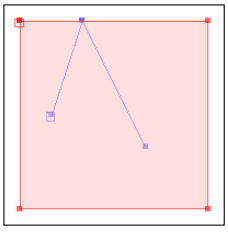
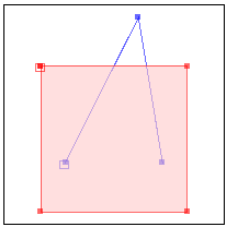
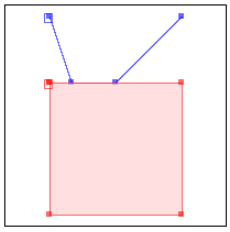
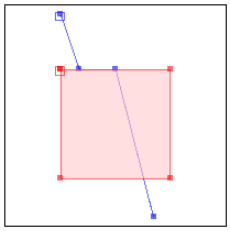
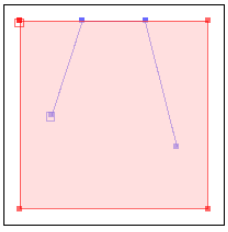
	Intersection Matrix AB 1010F01F2 BA 1010FF102 B Int Bdy Ext Int 1 0 1 A Bdy 0 F 0 Ext 1 F 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F F Contains F F Overlaps T T Covers F F CoveredBy F F
	Intersection Matrix AB 1010F0102 BA 1010F0102 B Int Bdy Ext Int 1 0 1 A Bdy 0 F 0 Ext 1 0 2	**OUI**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F F Contains F F Overlaps T T Covers F F CoveredBy F F
	Intersection Matrix AB 10100F1F2 BA 10100F1F2 B Int Bdy Ext Int 1 0 1 A Bdy 0 0 F Ext 1 F 2	**OUI**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F F Contains F F Overlaps T T Covers F F CoveredBy F F
	Intersection Matrix AB 0F1FF0102 BA 0F1FF0102 B Int Bdy Ext Int 0 F 1 A Bdy F F 0 Ext 1 0 2	**OUI**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 0F1F0F1F2 BA 0F1F0F1F2 B Int Bdy Ext Int 0 F 1 A Bdy F 0 F Ext 1 F 2	**OUI**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 0F1F00102 BA 0F1F00102 B Int Bdy Ext Int 0 F 1 A Bdy F 0 0 Ext 1 0 2	**OUI**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 0F10FF102 BA 001FF01F2 B Int Bdy Ext Int 0 F 1 A Bdy 0 F F Ext 1 0 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F

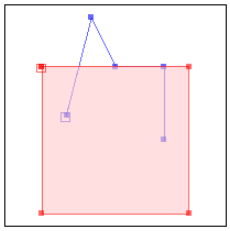
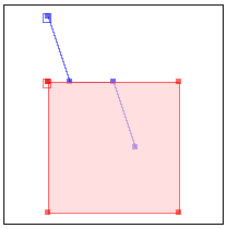
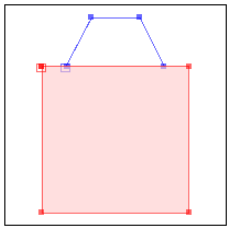
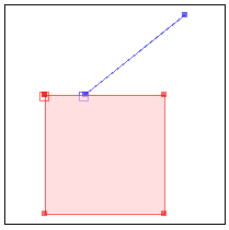
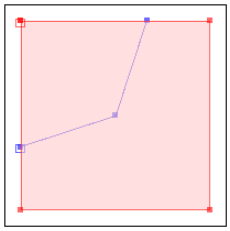
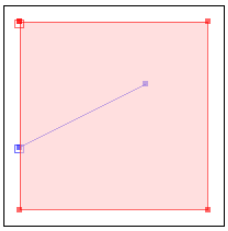
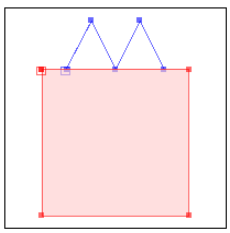
	Intersection Matrix AB 0F10F0102 BA 001FF0102 B Int Bdy Ext Int 0 F 1 A Bdy 0 F 0 Ext 1 0 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 0F100F102 BA 001F001F2 B Int Bdy Ext Int 0 F 1 A Bdy 0 0 F Ext 1 0 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 001FF01F2 BA 0F10FF102 B Int Bdy Ext Int 0 0 1 A Bdy F F 0 Ext 1 F 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 001FF0102 BA 0F10F0102 B Int Bdy Ext Int 0 0 1 A Bdy F F 0 Ext 1 0 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 001F001F2 BA 0F100F102 B Int Bdy Ext Int 0 0 1 A Bdy F 0 0 Ext 1 F 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 0010FF1F2 BA 0010FF1F2 B Int Bdy Ext Int 0 0 1 A Bdy 0 F F Ext 1 F 2	**OUI**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 0010FF102 BA 0010F01F2 B Int Bdy Ext Int 0 0 1 A Bdy 0 F F Ext 1 0 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F

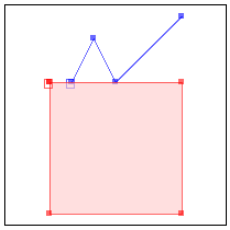
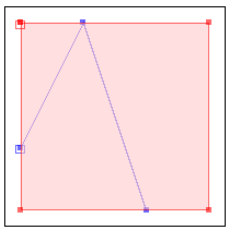
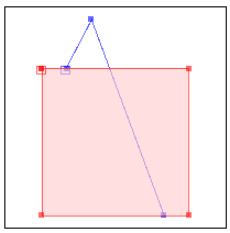
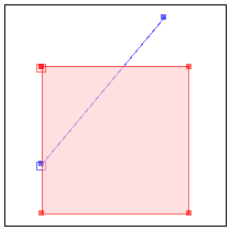
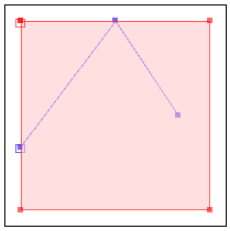
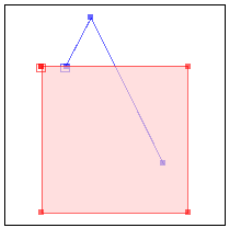
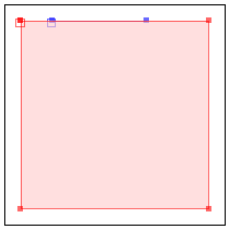
	Intersection Matrix AB 0010F01F2 BA 0010FF102 B Int Bdy Ext Int 0 0 1 A Bdy 0 F 0 Ext 1 F 2	NON	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 0010F0102 BA 0010F0102 B Int Bdy Ext Int 0 0 1 A Bdy 0 F 0 Ext 1 0 2	OUI	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 00100F1F2 BA 00100F1F2 B Int Bdy Ext Int 0 0 1 A Bdy 0 0 F Ext 1 F 2	OUI	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F

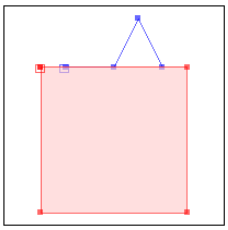
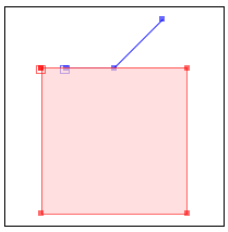
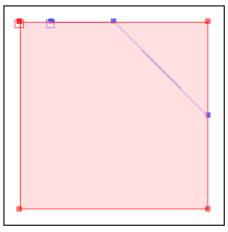
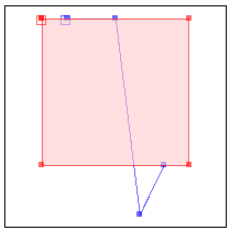
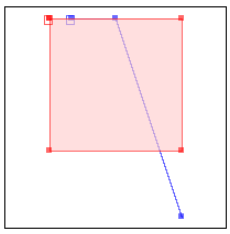
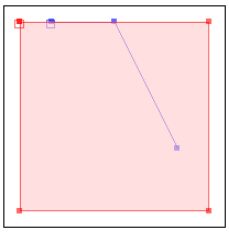
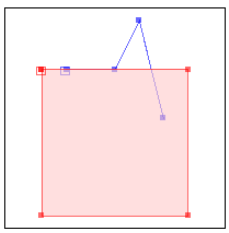
Polyligne / Polygone (31 relations)

Schéma	Matrice	Symétrie	Prédicats
	Intersection Matrix AB FF1FF0212 BA FF2FF1102 B Int Bdy Ext Int F F 1 A Bdy F F 0 Ext 2 1 2	NON	Binary Predicates AB BA Equals F F Disjoint T T Intersects F F Touches F F Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 1FF0FF212 BA 102FF1FF2 B Int Bdy Ext Int 1 F F A Bdy 0 F F Ext 2 1 2	NON	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within T F Contains F T Overlaps F F Covers F T CoveredBy T F
	Intersection Matrix AB F01FF0212 BA FF20F1102 B Int Bdy Ext Int F 0 1 A Bdy F F 0 Ext 2 1 2	NON	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F

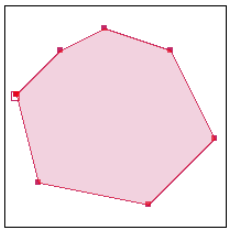
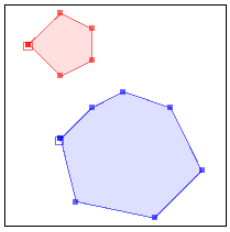
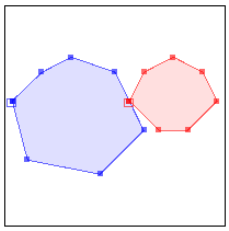
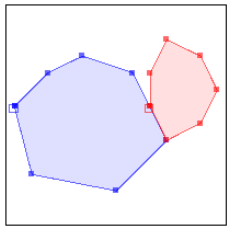
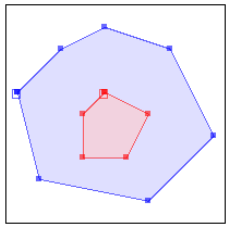
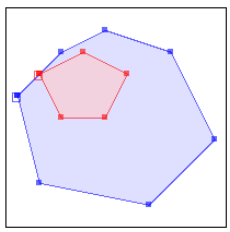
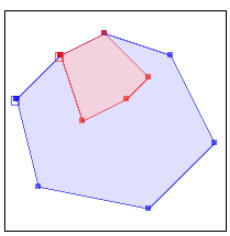
	Intersection Matrix AB 101FF0212 BA 1F20F1102 B Int Bdy Ext Int 1 0 1 A Bdy F F 0 Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 1010F0212 BA 1020F1102 B Int Bdy Ext Int 1 0 1 A Bdy 0 F 0 Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 10F0FF212 BA 1020F1FF2 B Int Bdy Ext Int 1 0 F A Bdy 0 F F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within T F Contains F T Overlaps F F Covers F T CoveredBy T F
	Intersection Matrix AB 1010FF212 BA 1020F11F2 B Int Bdy Ext Int 1 0 1 A Bdy 0 F F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB F11FF0212 BA FF21F1102 B Int Bdy Ext Int F 1 1 A Bdy F F 0 Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 111FF0212 BA 1F21F1102 B Int Bdy Ext Int 1 1 1 A Bdy F F 0 Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 11F0FF212 BA 1021F1FF2 B Int Bdy Ext Int 1 1 F A Bdy 0 F F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within T F Contains F T Overlaps F F Covers F T CoveredBy T F

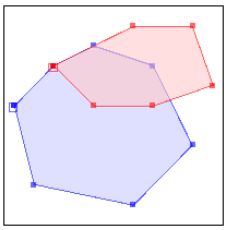
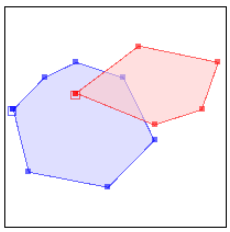
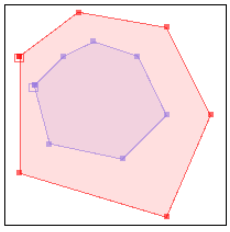
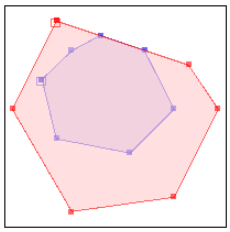
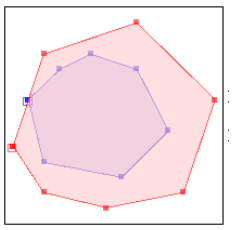
	Intersection Matrix AB 1110FF212 BA 1021F11F2 B Int Bdy Ext Int 1 1 1 A Bdy 0 F F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 1110F0212 BA 1021F1102 B Int Bdy Ext Int 1 1 1 A Bdy 0 F 0 Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB FF1F0F212 BA FF2F011F2 B Int Bdy Ext Int F F 1 A Bdy F 0 F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB FF1F00212 BA FF2F01102 B Int Bdy Ext Int F F 1 A Bdy F 0 0 Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 1FFF0F212 BA 1F2F01FF2 B Int Bdy Ext Int 1 F F A Bdy F 0 F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within T F Contains F T Overlaps F F Covers F T CoveredBy T F
	Intersection Matrix AB 1FF00F212 BA 102F01FF2 B Int Bdy Ext Int 1 F F A Bdy 0 0 F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within T F Contains F T Overlaps F F Covers F T CoveredBy T F
	Intersection Matrix AB F01F0F212 BA FF20011F2 B Int Bdy Ext Int F 0 1 A Bdy F 0 F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F

	Intersection Matrix AB F01F00212 BA FF2001102 B Int Bdy Ext Int F 0 1 A Bdy F 0 0 Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 10FF0F212 BA 1F2001FF2 B Int Bdy Ext Int 1 0 F A Bdy F 0 F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within T F Contains F T Overlaps F F Covers F T CoveredBy T F
	Intersection Matrix AB 101F0F212 BA 1F20011F2 B Int Bdy Ext Int 1 0 1 A Bdy F 0 F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 101F00212 BA 1F2001102 B Int Bdy Ext Int 1 0 1 A Bdy F 0 0 Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 10F00F212 BA 102001FF2 B Int Bdy Ext Int 1 0 F A Bdy 0 0 F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within T F Contains F T Overlaps F F Covers F T CoveredBy T F
	Intersection Matrix AB 10100F212 BA 1020011F2 B Int Bdy Ext Int 1 0 1 A Bdy 0 0 F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB F1FF0F212 BA FF2101FF2 B Int Bdy Ext Int F 1 F A Bdy F 0 F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F T CoveredBy T F

	Intersection Matrix AB F11F0F212 BA FF21011F2 B Int Bdy Ext Int F 1 1 A Bdy F 0 F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB F11F00212 BA FF2101102 B Int Bdy Ext Int F 1 1 A Bdy F 0 0 Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 11FF0F212 BA 1F2101FF2 B Int Bdy Ext Int 1 1 F A Bdy F 0 F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within T F Contains F T Overlaps F F Covers F T CoveredBy T F
	Intersection Matrix AB 111F0F212 BA 1F21011F2 B Int Bdy Ext Int 1 1 1 A Bdy F 0 F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 111F00212 BA 1F2101102 B Int Bdy Ext Int 1 1 1 A Bdy F 0 0 Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 11F00F212 BA 102101FF2 B Int Bdy Ext Int 1 1 F A Bdy 0 0 F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within T F Contains F T Overlaps F F Covers F T CoveredBy T F
	Intersection Matrix AB 11100F212 BA 1021011F2 B Int Bdy Ext Int 1 1 1 A Bdy 0 0 F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses T T Within F F Contains F F Overlaps F F Covers F F CoveredBy F F

Polygone / Polygone (12 relations)

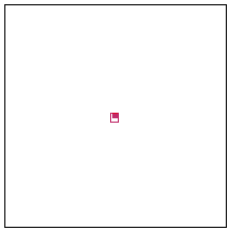
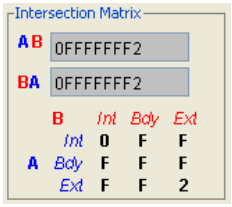
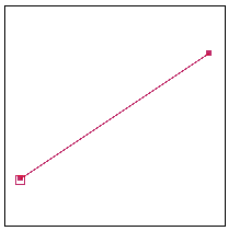
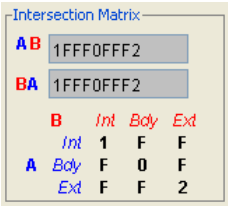
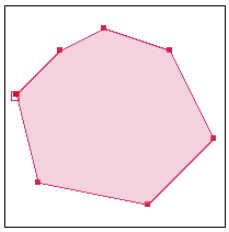
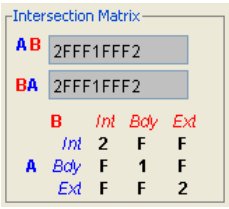
Schéma	Matrice	Symétrie	Prédicats
	Intersection Matrix AB 2FFF1FFF2 BA 2FFF1FFF2 B Int Bdy Ext Int 2 F F A Bdy F 1 F Ext F F 2	OUI	Binary Predicates AB BA Equals T T Disjoint F F Intersects T T Touches F F Crosses F F Within T T Contains T T Overlaps F F Covers T T CoveredBy T T
	Intersection Matrix AB FF2FF1212 BA FF2FF1212 B Int Bdy Ext Int F F 2 A Bdy F F 1 Ext 2 1 2	OUI	Binary Predicates AB BA Equals F F Disjoint T T Intersects F F Touches F F Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB FF2F01212 BA FF2F01212 B Int Bdy Ext Int F F 2 A Bdy F 0 1 Ext 2 1 2	OUI	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB FF2F11212 BA FF2F11212 B Int Bdy Ext Int F F 2 A Bdy F 1 1 Ext 2 1 2	OUI	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches T T Crosses F F Within F F Contains F F Overlaps F F Covers F F CoveredBy F F
	Intersection Matrix AB 212FF1FF2 BA 2FF1FF212 B Int Bdy Ext Int 2 1 2 A Bdy F F 1 Ext F F 2	NON	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F T Contains T F Overlaps F F Covers T F CoveredBy F T
	Intersection Matrix AB 212F01FF2 BA 2FF10F212 B Int Bdy Ext Int 2 1 2 A Bdy F 0 1 Ext F F 2	NON	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F T Contains T F Overlaps F F Covers T F CoveredBy F T
	Intersection Matrix AB 212F11FF2 BA 2FF11F212 B Int Bdy Ext Int 2 1 2 A Bdy F 1 1 Ext F F 2	NON	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F T Contains T F Overlaps F F Covers T F CoveredBy F T

	Intersection Matrix AB 212111212 BA 212111212 B Int Bdy Ext Int 2 1 2 A Bdy 1 1 1 Ext 2 1 2	**OUI**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F F Contains F F Overlaps T T Covers F F CoveredBy F F
	Intersection Matrix AB 212101212 BA 212101212 B Int Bdy Ext Int 2 1 2 A Bdy 1 0 1 Ext 2 1 2	**OUI**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within F F Contains F F Overlaps T T Covers F F CoveredBy F F
	Intersection Matrix AB 2FF1FF212 BA 212FF1FF2 B Int Bdy Ext Int 2 F F A Bdy 1 F F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within T F Contains F T Overlaps F F Covers F T CoveredBy T F
	Intersection Matrix AB 2FF11F212 BA 212F11FF2 B Int Bdy Ext Int 2 F F A Bdy 1 1 F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within T F Contains F T Overlaps F F Covers F T CoveredBy T F
	Intersection Matrix AB 2FF10F212 BA 212F01FF2 B Int Bdy Ext Int 2 F F A Bdy 1 0 F Ext 2 1 2	**NON**	Binary Predicates AB BA Equals F F Disjoint F F Intersects T T Touches F F Crosses F F Within T F Contains F T Overlaps F F Covers F T CoveredBy T F

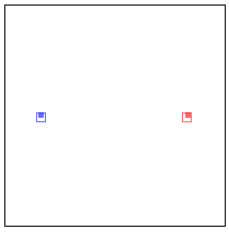
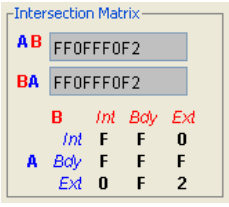
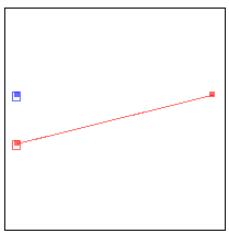
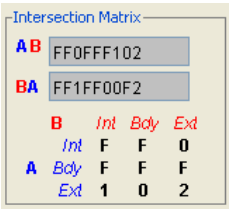
6 - Classement des relations topologiques par prédicat

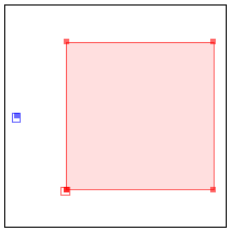
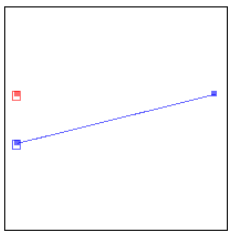
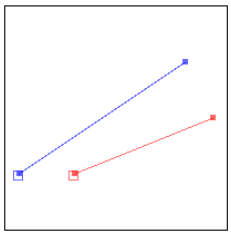
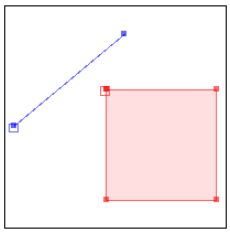
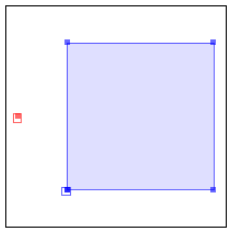
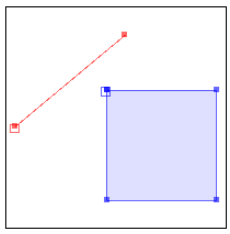
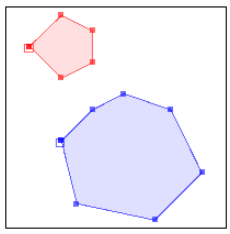
Ce classement permet d'illustrer concrètement les effets des prédicats.

Equals [T*F**FFF*]

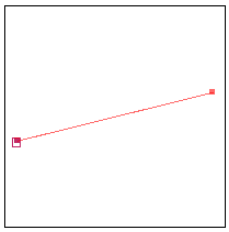
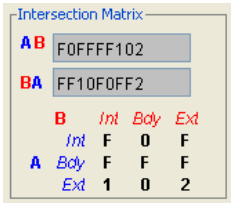
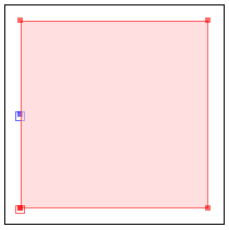
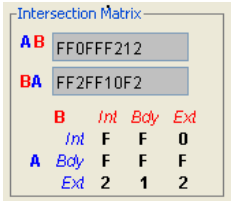
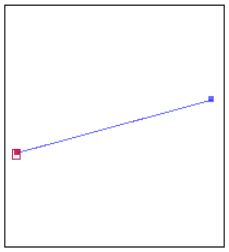
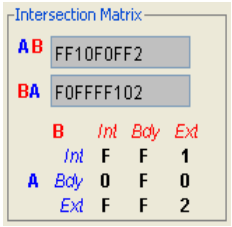
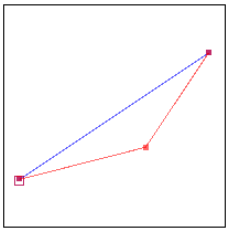
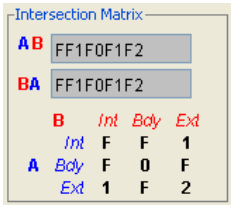
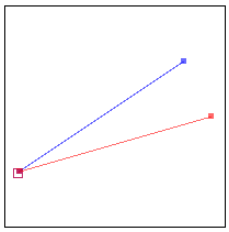
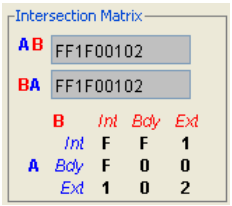
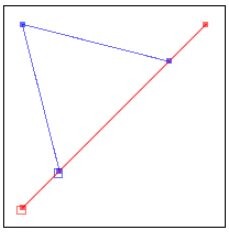
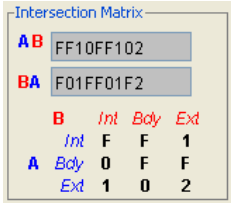
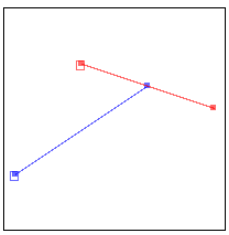
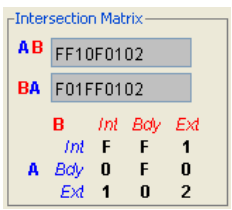
Relation	Schéma	Matrice
P/P		
L/L		
S/S		

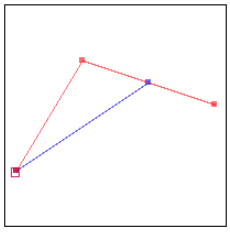
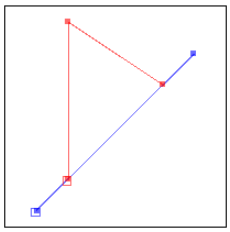
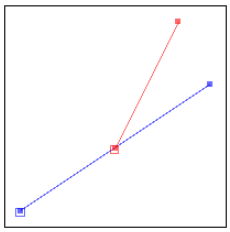
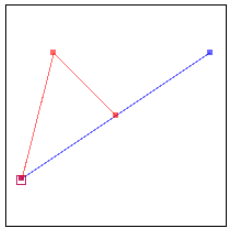
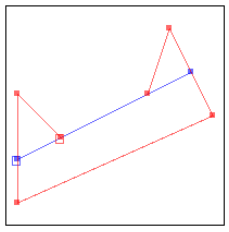
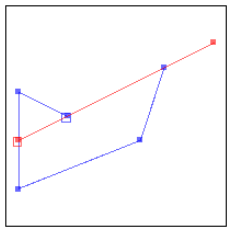
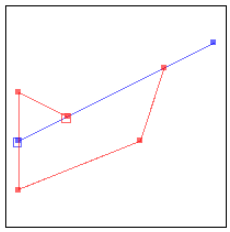
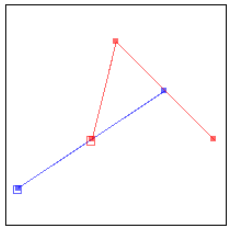
Disjoint [FF*FF****]

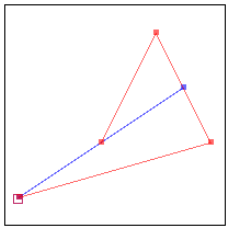
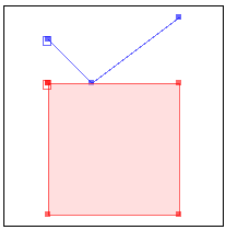
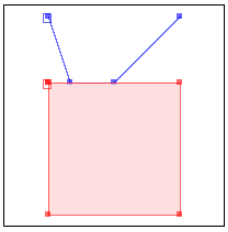
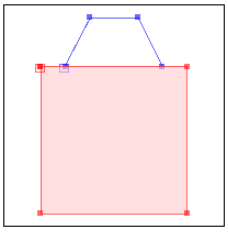
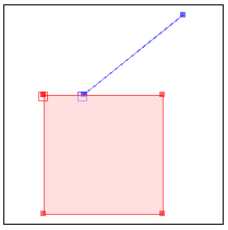
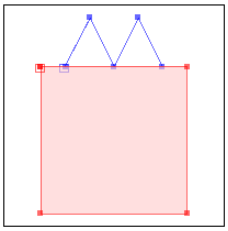
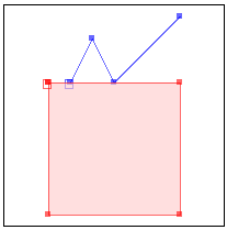
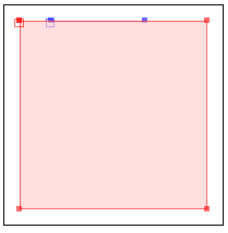
Relation	Schéma	Matrice
P/P		
P/L		

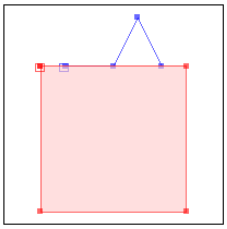
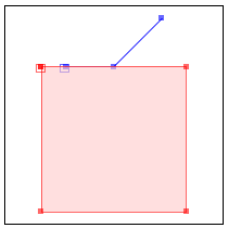
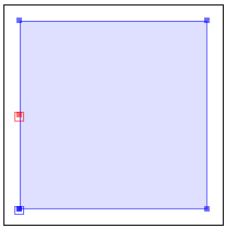
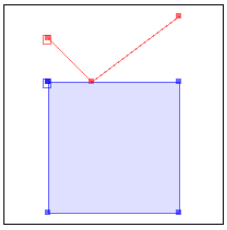
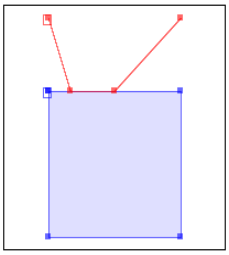
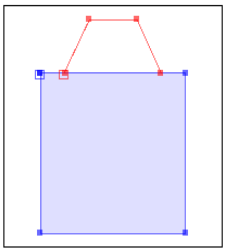
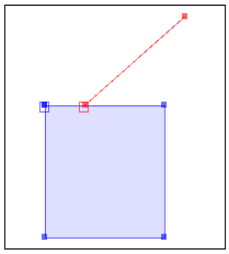
P/S		Intersection Matrix AB FF0FFF212 BA FF2FF10F2 B Int Bdy Ext Int F F 0 A Bdy F F F Ext 2 1 2
L/P		Intersection Matrix AB FF1FF00F2 BA FF0FFF102 B Int Bdy Ext Int F F 1 A Bdy F F 0 Ext 0 F 2
L/L		Intersection Matrix AB FF1FF0102 BA FF1FF0102 B Int Bdy Ext Int F F 1 A Bdy F F 0 Ext 1 0 2
L/S		Intersection Matrix AB FF1FF0212 BA FF2FF1102 B Int Bdy Ext Int F F 1 A Bdy F F 0 Ext 2 1 2
S/P		Intersection Matrix AB FF2FF10F2 BA FF0FFF212 B Int Bdy Ext Int F F 2 A Bdy F F 1 Ext 0 F 2
S/L		Intersection Matrix AB FF2FF1102 BA FF1FF0212 B Int Bdy Ext Int F F 2 A Bdy F F 1 Ext 1 0 2
S/S		Intersection Matrix AB FF2FF1212 BA FF2FF1212 B Int Bdy Ext Int F F 2 A Bdy F F 1 Ext 2 1 2

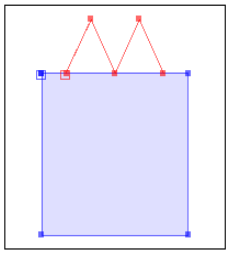
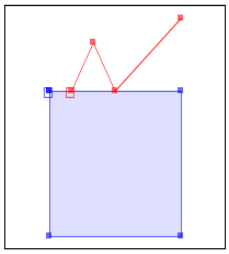
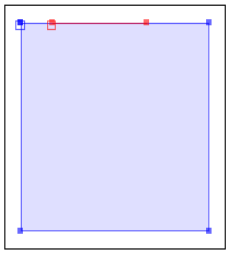
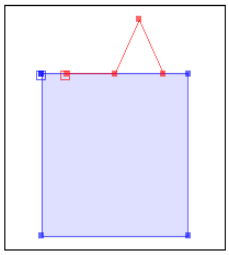
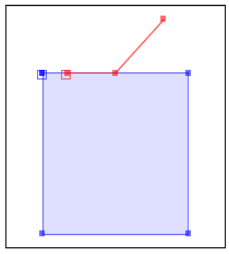
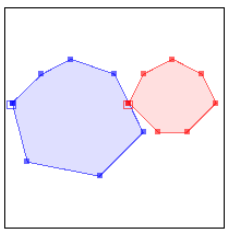
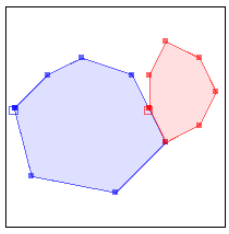
Touches [FT*******] , [F***T****] , [F**T*****] (non applicable à P/P)

Relation	Schéma	Matrice
P/L		
P/S		
L/P		
L/L		
L/L		
L/L		
L/L		

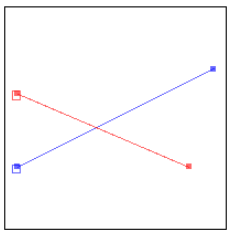
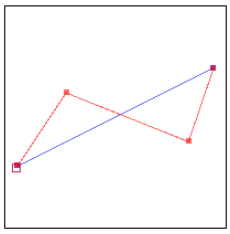
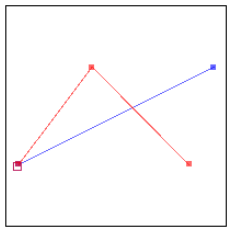
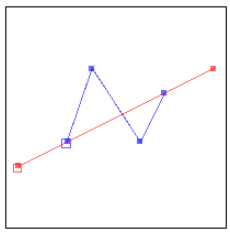
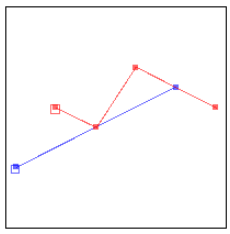
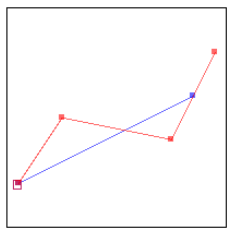
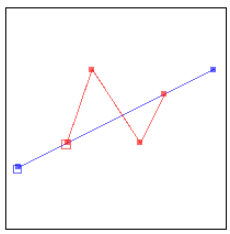
L/L		Intersection Matrix AB FF100F102 BA F01F001F2 B Int Bdy Ext Int F F 1 A Bdy 0 0 F Ext 1 0 2
L/L		Intersection Matrix AB F01FF01F2 BA FF10FF102 B Int Bdy Ext Int F 0 1 A Bdy F F 0 Ext 1 F 2
L/L		Intersection Matrix AB F01FF0102 BA FF10F0102 B Int Bdy Ext Int F 0 1 A Bdy F F 0 Ext 1 0 2
L/L		Intersection Matrix AB F01F001F2 BA FF100F102 B Int Bdy Ext Int F 0 1 A Bdy F 0 0 Ext 1 F 2
L/L		Intersection Matrix AB F010FF1F2 BA F010FF1F2 B Int Bdy Ext Int F 0 1 A Bdy 0 F F Ext 1 F 2
L/L		Intersection Matrix AB F010FF102 BA F010F01F2 B Int Bdy Ext Int F 0 1 A Bdy 0 F F Ext 1 0 2
L/L		Intersection Matrix AB F010F01F2 BA F010FF102 B Int Bdy Ext Int F 0 1 A Bdy 0 F 0 Ext 1 F 2
L/L		Intersection Matrix AB F010F0102 BA F010F0102 B Int Bdy Ext Int F 0 1 A Bdy 0 F 0 Ext 1 0 2

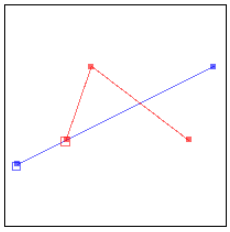
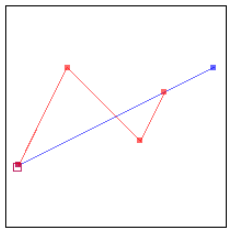
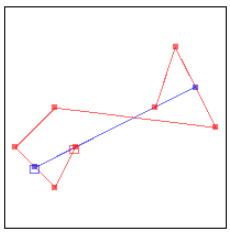
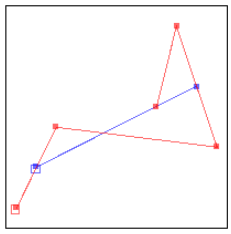
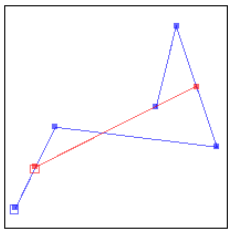
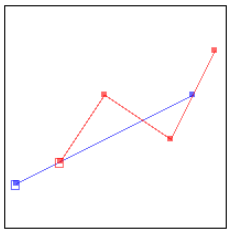
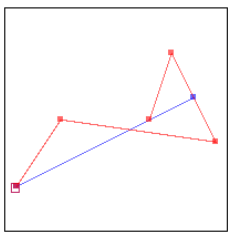
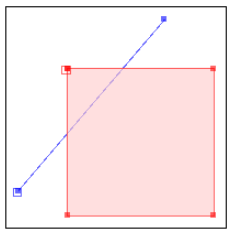
L/L		Intersection Matrix AB F0100F1F2 BA F0100F1F2 B Int Bdy Ext Int F 0 1 A Bdy 0 0 F Ext 1 F 2
L/S		Intersection Matrix AB F01FF0212 BA FF20F1102 B Int Bdy Ext Int F 0 1 A Bdy F F 0 Ext 2 1 2
L/S		Intersection Matrix AB F11FF0212 BA FF21F1102 B Int Bdy Ext Int F 1 1 A Bdy F F 0 Ext 2 1 2
L/S		Intersection Matrix AB FF1F0F212 BA FF2F011F2 B Int Bdy Ext Int F F 1 A Bdy F 0 F Ext 2 1 2
L/S		Intersection Matrix AB FF1F00212 BA FF2F01102 B Int Bdy Ext Int F F 1 A Bdy F 0 0 Ext 2 1 2
L/S		Intersection Matrix AB F01F0F212 BA FF20011F2 B Int Bdy Ext Int F 0 1 A Bdy F 0 F Ext 2 1 2
L/S		Intersection Matrix AB F01F00212 BA FF2001102 B Int Bdy Ext Int F 0 1 A Bdy F 0 0 Ext 2 1 2
L/S		Intersection Matrix AB F1FF0F212 BA FF2101FF2 B Int Bdy Ext Int F 1 F A Bdy F 0 F Ext 2 1 2

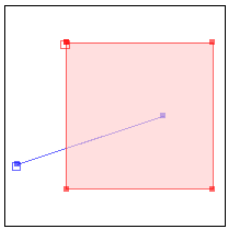
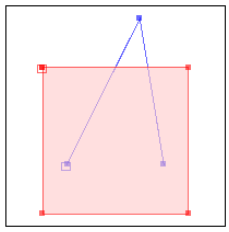
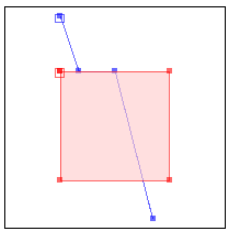
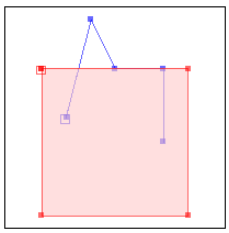
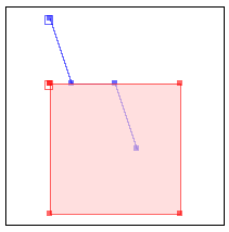
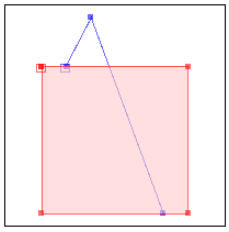
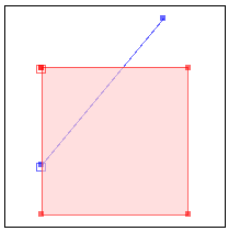
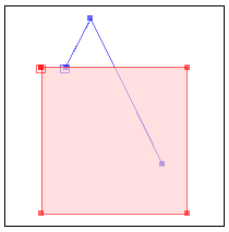
L/S		Intersection Matrix AB F11F0F212 BA FF21011F2 B Int Bdy Ext Int F 1 1 A Bdy F 0 F Ext 2 1 2
L/S		Intersection Matrix AB F11F00212 BA FF2101102 B Int Bdy Ext Int F 1 1 A Bdy F 0 0 Ext 2 1 2
S/P		Intersection Matrix AB FF20F1FF2 BA F0FFFF212 B Int Bdy Ext Int F F 2 A Bdy 0 F 1 Ext F F 2
S/L		Intersection Matrix AB FF20F1102 BA F01FF0212 B Int Bdy Ext Int F F 2 A Bdy 0 F 1 Ext 1 0 2
S/L		Intersection Matrix AB FF21F1102 BA F11FF0212 B Int Bdy Ext Int F F 2 A Bdy 1 F 1 Ext 1 0 2
S/L		Intersection Matrix AB FF2F011F2 BA FF1F0F212 B Int Bdy Ext Int F F 2 A Bdy F 0 1 Ext 1 F 2
S/L		Intersection Matrix AB FF2F01102 BA FF1F00212 B Int Bdy Ext Int F F 2 A Bdy F 0 1 Ext 1 0 2

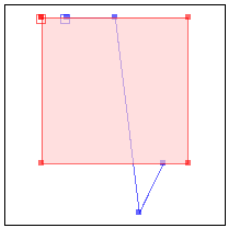
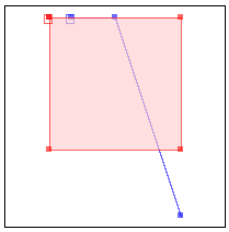
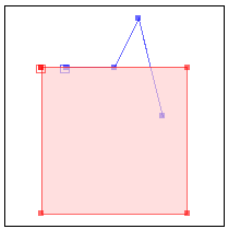
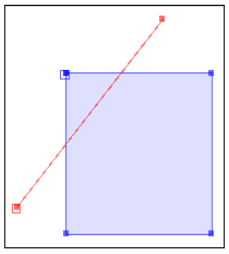
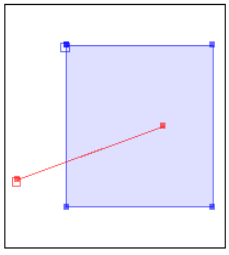
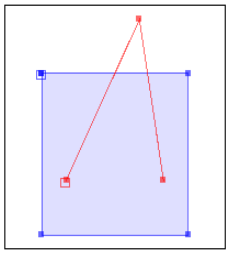
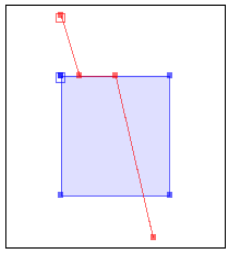
S/L		Intersection Matrix AB FF20011F2 BA F01F0F212 B Int Bdy Ext Int F F 2 A Bdy 0 0 1 Ext 1 F 2
S/L		Intersection Matrix AB FF2001102 BA F01F00212 B Int Bdy Ext Int F F 2 A Bdy 0 0 1 Ext 1 0 2
S/L		Intersection Matrix AB FF2101FF2 BA F1FF0F212 B Int Bdy Ext Int F F 2 A Bdy 1 0 1 Ext F F 2
S/L		Intersection Matrix AB FF21011F2 BA F11F0F212 B Int Bdy Ext Int F F 2 A Bdy 1 0 1 Ext 1 F 2
S/L		Intersection Matrix AB FF2101102 BA F11F00212 B Int Bdy Ext Int F F 2 A Bdy 1 0 1 Ext 1 0 2
S/S		Intersection Matrix AB FF2F01212 BA FF2F01212 B Int Bdy Ext Int F F 2 A Bdy F 0 1 Ext 2 1 2
S/S		Intersection Matrix AB FF2F11212 BA FF2F11212 B Int Bdy Ext Int F F 2 A Bdy F 1 1 Ext 2 1 2

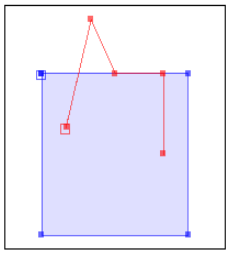
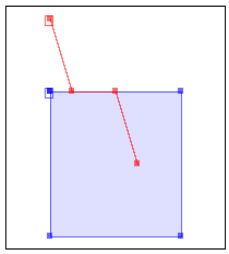
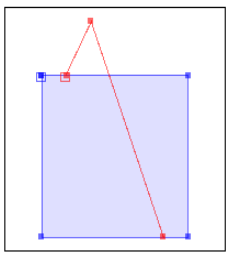
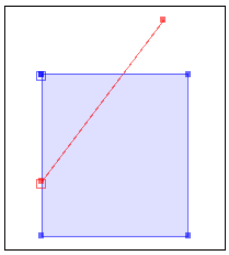
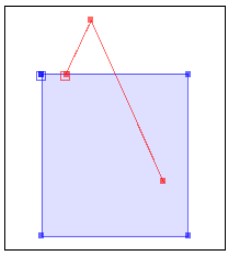
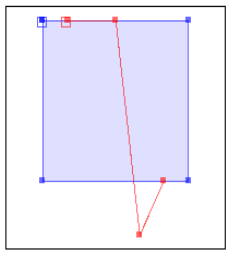
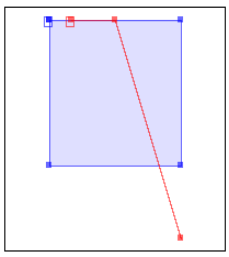
Crosses [T*T******] (L/S), [T*****T**] (L/S, S/L), [0********] (L/L)

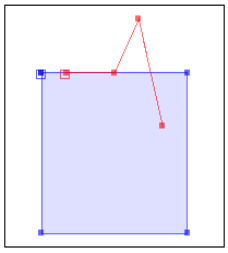
Relation	Schéma	Matrice
L/L		Intersection Matrix AB 0F1FF0102 BA 0F1FF0102 B Int Bdy Ext Int 0 F 1 A Bdy F F 0 Ext 1 0 2
L/L		Intersection Matrix AB 0F1F0F1F2 BA 0F1F0F1F2 B Int Bdy Ext Int 0 F 1 A Bdy F 0 F Ext 1 F 2
L/L		Intersection Matrix AB 0F1F00102 BA 0F1F00102 B Int Bdy Ext Int 0 F 1 A Bdy F 0 0 Ext 1 0 2
L/L		Intersection Matrix AB 0F10FF102 BA 001FF01F2 B Int Bdy Ext Int 0 F 1 A Bdy 0 F F Ext 1 0 2
L/L		Intersection Matrix AB 0F10F0102 BA 001FF0102 B Int Bdy Ext Int 0 F 1 A Bdy 0 F 0 Ext 1 0 2
L/L		Intersection Matrix AB 0F100F102 BA 001F001F2 B Int Bdy Ext Int 0 F 1 A Bdy 0 0 F Ext 1 0 2
L/L		Intersection Matrix AB 001FF01F2 BA 0F10FF102 B Int Bdy Ext Int 0 0 1 A Bdy F F 0 Ext 1 F 2

L/L		Intersection Matrix AB 001FF0102 BA 0F10F0102 B Int Bdy Ext Int 0 0 1 A Bdy F F 0 Ext 1 0 2
L/L		Intersection Matrix AB 001F001F2 BA 0F100F102 B Int Bdy Ext Int 0 0 1 A Bdy F 0 0 Ext 1 F 2
L/L		Intersection Matrix AB 0010FF1F2 BA 0010FF1F2 B Int Bdy Ext Int 0 0 1 A Bdy 0 F F Ext 1 F 2
L/L		Intersection Matrix AB 0010FF102 BA 0010F01F2 B Int Bdy Ext Int 0 0 1 A Bdy 0 F F Ext 1 0 2
L/L		Intersection Matrix AB 0010F01F2 BA 0010FF102 B Int Bdy Ext Int 0 0 1 A Bdy 0 F 0 Ext 1 F 2
L/L		Intersection Matrix AB 0010F0102 BA 0010F0102 B Int Bdy Ext Int 0 0 1 A Bdy 0 F 0 Ext 1 0 2
L/L		Intersection Matrix AB 00100F1F2 BA 00100F1F2 B Int Bdy Ext Int 0 0 1 A Bdy 0 0 F Ext 1 F 2
L/S		Intersection Matrix AB 101FF0212 BA 1F20F1102 B Int Bdy Ext Int 1 0 1 A Bdy F F 0 Ext 2 1 2

L/S		Intersection Matrix AB 1010F0212 BA 1020F1102 B Int Bdy Ext Int 1 0 1 A Bdy 0 F 0 Ext 2 1 2
L/S		Intersection Matrix AB 1010FF212 BA 1020F11F2 B Int Bdy Ext Int 1 0 1 A Bdy 0 F F Ext 2 1 2
L/S		Intersection Matrix AB 111FF0212 BA 1F21F1102 B Int Bdy Ext Int 1 1 1 A Bdy F F 0 Ext 2 1 2
L/S		Intersection Matrix AB 1110FF212 BA 1021F11F2 B Int Bdy Ext Int 1 1 1 A Bdy 0 F F Ext 2 1 2
L/S		Intersection Matrix AB 1110F0212 BA 1021F1102 B Int Bdy Ext Int 1 1 1 A Bdy 0 F 0 Ext 2 1 2
L/S		Intersection Matrix AB 101F0F212 BA 1F20011F2 B Int Bdy Ext Int 1 0 1 A Bdy F 0 F Ext 2 1 2
L/S		Intersection Matrix AB 101F00212 BA 1F2001102 B Int Bdy Ext Int 1 0 1 A Bdy F 0 0 Ext 2 1 2
L/S		Intersection Matrix AB 10100F212 BA 1020011F2 B Int Bdy Ext Int 1 0 1 A Bdy 0 0 F Ext 2 1 2

L/S		Intersection Matrix AB 111F0F212 BA 1F21011F2 B Int Bdy Ext Int 1 1 1 A Bdy F 0 F Ext 2 1 2
L/S		Intersection Matrix AB 111F00212 BA 1F2101102 B Int Bdy Ext Int 1 1 1 A Bdy F 0 0 Ext 2 1 2
L/S		Intersection Matrix AB 11100F212 BA 1021011F2 B Int Bdy Ext Int 1 1 1 A Bdy 0 0 F Ext 2 1 2
S/L		Intersection Matrix AB 1F20F1102 BA 101FF0212 B Int Bdy Ext Int 1 F 2 A Bdy 0 F 1 Ext 1 0 2
S/L		Intersection Matrix AB 1020F1102 BA 1010F0212 B Int Bdy Ext Int 1 0 2 A Bdy 0 F 1 Ext 1 0 2
S/L		Intersection Matrix AB 1020F11F2 BA 1010FF212 B Int Bdy Ext Int 1 0 2 A Bdy 0 F 1 Ext 1 F 2
S/L		Intersection Matrix AB 1F21F1102 BA 111FF0212 B Int Bdy Ext Int 1 F 2 A Bdy 1 F 1 Ext 1 0 2

S/L		Intersection Matrix AB 1021F11F2 BA 1110FF212 B Int Bdy Ext Int 1 0 2 A Bdy 1 F 1 Ext 1 F 2
S/L		Intersection Matrix AB 1021F1102 BA 1110F0212 B Int Bdy Ext Int 1 0 2 A Bdy 1 F 1 Ext 1 0 2
S/L		Intersection Matrix AB 1F20011F2 BA 101F0F212 B Int Bdy Ext Int 1 F 2 A Bdy 0 0 1 Ext 1 F 2
S/L		Intersection Matrix AB 1F2001102 BA 101F00212 B Int Bdy Ext Int 1 F 2 A Bdy 0 0 1 Ext 1 0 2
S/L		Intersection Matrix AB 1020011F2 BA 10100F212 B Int Bdy Ext Int 1 0 2 A Bdy 0 0 1 Ext 1 F 2
S/L		Intersection Matrix AB 1F21011F2 BA 111F0F212 B Int Bdy Ext Int 1 F 2 A Bdy 1 0 1 Ext 1 F 2
S/L		Intersection Matrix AB 1F2101102 BA 111F00212 B Int Bdy Ext Int 1 F 2 A Bdy 1 0 1 Ext 1 0 2

S/L		Intersection Matrix AB 1021011F2 BA 11100F212 B Int Bdy Ext Int 1 0 2 A Bdy 1 0 1 Ext 1 F 2

Within [T*F**F***]

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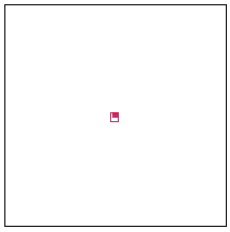
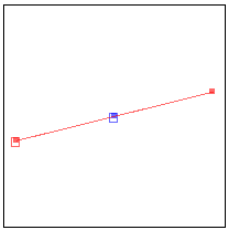
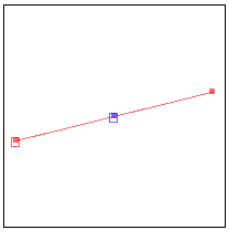
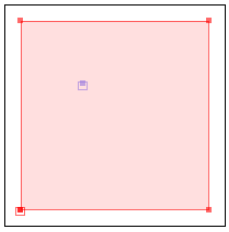
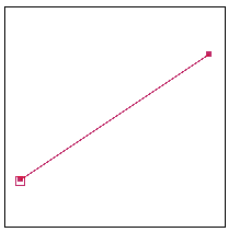
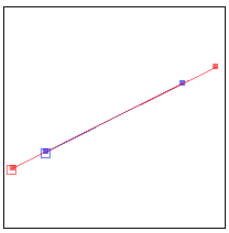
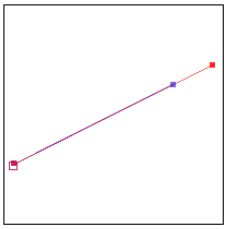
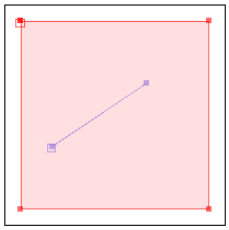
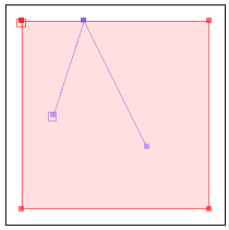
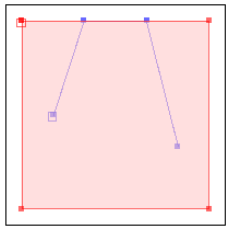
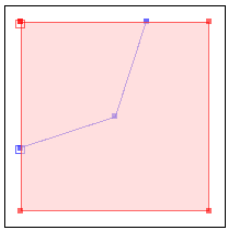
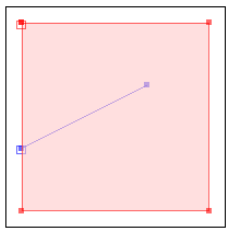
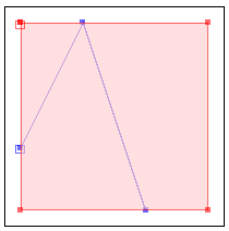
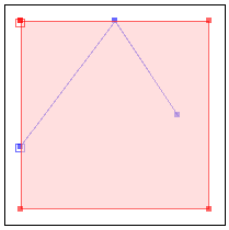
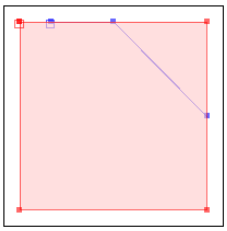
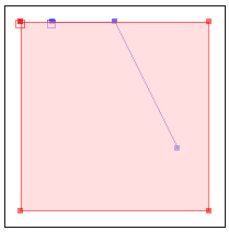
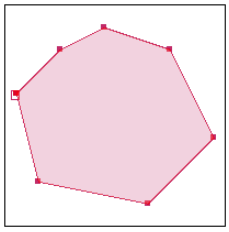
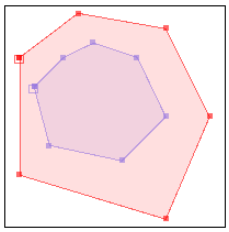
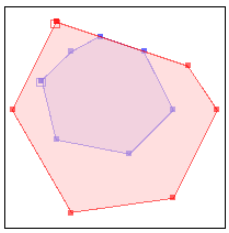
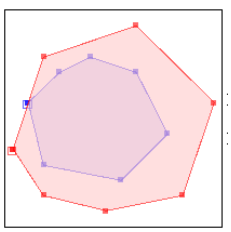
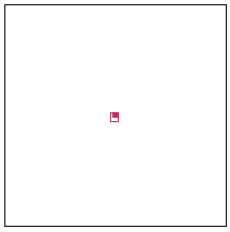
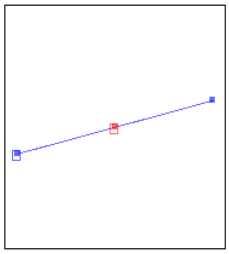
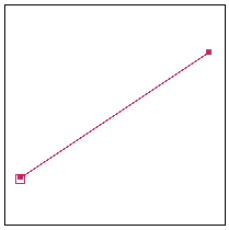
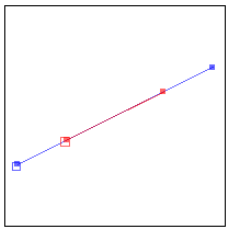
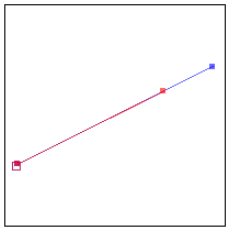
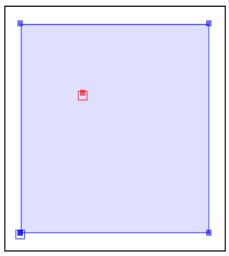
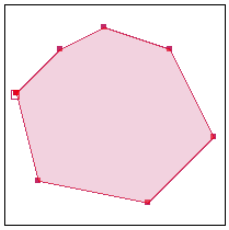
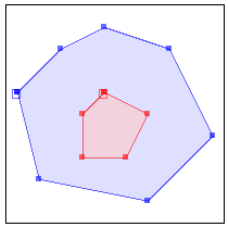
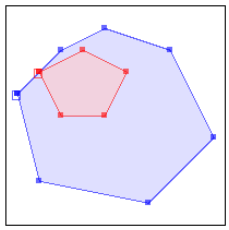
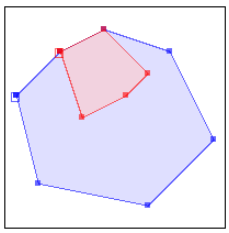
P/P		Intersection Matrix AB 0FFFFFFF2 BA 0FFFFFFF2 B Int Bdy Ext Int 0 F F A Bdy F F F Ext F F 2
P/L		Intersection Matrix AB 0FFFFF102 BA 0F1FF0FF2 B Int Bdy Ext Int 0 F F A Bdy F F F Ext 1 0 2
P/L		Intersection Matrix AB 0FFFFF102 BA 0F1FF0FF2 B Int Bdy Ext Int 0 F F A Bdy F F F Ext 1 0 2
P/S		Intersection Matrix AB 0FFFFF212 BA 0F2FF1FF2 B Int Bdy Ext Int 0 F F A Bdy F F F Ext 2 1 2
L/L		Intersection Matrix AB 1FFF0FFF2 BA 1FFF0FFF2 B Int Bdy Ext Int 1 F F A Bdy F 0 F Ext F F 2
L/L		Intersection Matrix AB 1FF0FF102 BA 101FF0FF2 B Int Bdy Ext Int 1 F F A Bdy 0 F F Ext 1 0 2

L/L		Intersection Matrix AB 1FF00F102 BA 101F00FF2 B Int Bdy Ext A Int 1 F F Bdy 0 0 F Ext 1 0 2
L/S		Intersection Matrix AB 1FF0FF212 BA 102FF1FF2 B Int Bdy Ext A Int 1 F F Bdy 0 F F Ext 2 1 2
L/S		Intersection Matrix AB 10F0FF212 BA 1020F1FF2 B Int Bdy Ext A Int 1 0 F Bdy 0 F F Ext 2 1 2
L/S		Intersection Matrix AB 11F0FF212 BA 1021F1FF2 B Int Bdy Ext A Int 1 1 F Bdy 0 F F Ext 2 1 2
L/S		Intersection Matrix AB 1FFF0F212 BA 1F2F01FF2 B Int Bdy Ext A Int 1 F F Bdy F 0 F Ext 2 1 2
L/S		Intersection Matrix AB 1FF00F212 BA 102F01FF2 B Int Bdy Ext A Int 1 F F Bdy 0 0 F Ext 2 1 2
L/S		Intersection Matrix AB 10FF0F212 BA 1F2001FF2 B Int Bdy Ext A Int 1 0 F Bdy F 0 F Ext 2 1 2

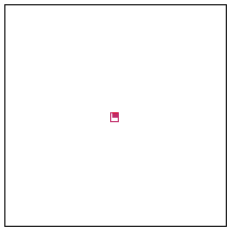
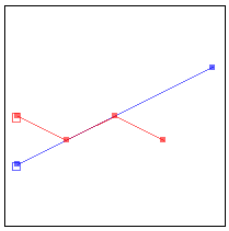
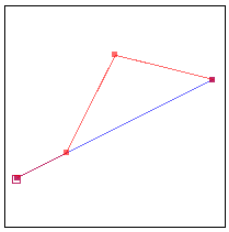
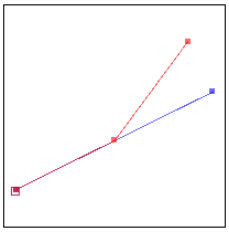
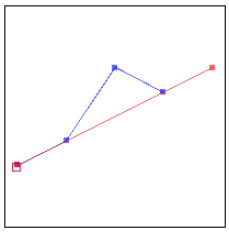
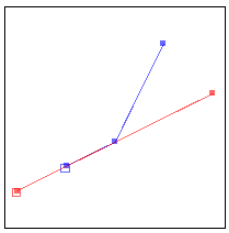
L/S		Intersection Matrix AB 10F00F212 BA 102001FF2 B Int Bdy Ext Int 1 0 F A Bdy 0 0 F Ext 2 1 2
L/S		Intersection Matrix AB 11FF0F212 BA 1F2101FF2 B Int Bdy Ext Int 1 1 F A Bdy F 0 F Ext 2 1 2
L/S		Intersection Matrix AB 11F00F212 BA 102101FF2 B Int Bdy Ext Int 1 1 F A Bdy 0 0 F Ext 2 1 2
S/S		Intersection Matrix AB 2FFF1FFF2 BA 2FFF1FFF2 B Int Bdy Ext Int 2 F F A Bdy F 1 F Ext F F 2
S/S		Intersection Matrix AB 2FF1FF212 BA 212FF1FF2 B Int Bdy Ext Int 2 F F A Bdy 1 F F Ext 2 1 2
S/S		Intersection Matrix AB 2FF11F212 BA 212F11FF2 B Int Bdy Ext Int 2 F F A Bdy 1 1 F Ext 2 1 2
S/S		Intersection Matrix AB 2FF10F212 BA 212F01FF2 B Int Bdy Ext Int 2 F F A Bdy 1 0 F Ext 2 1 2

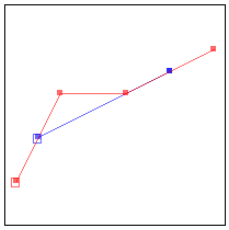
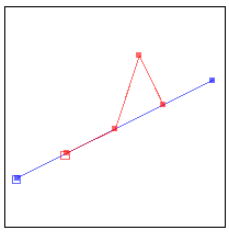
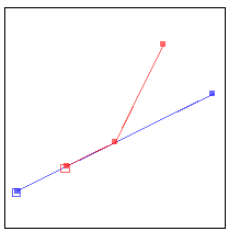
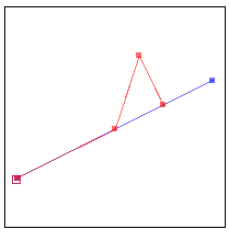
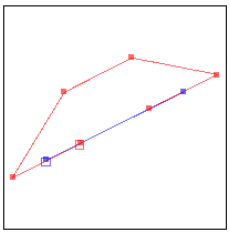
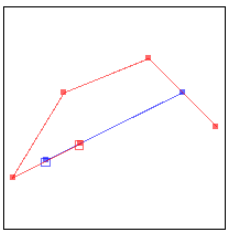
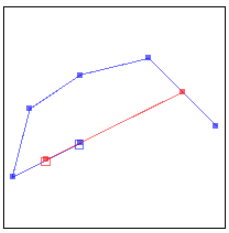
Contains [T*****FF*]

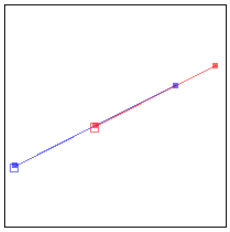
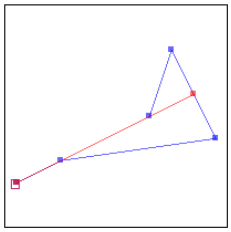
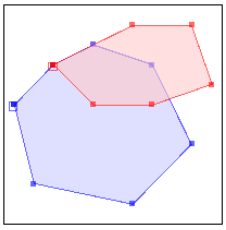
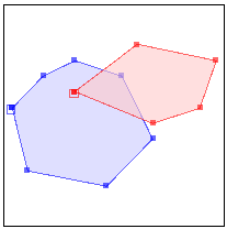
Relation	Schéma	Matrice
P/P		Intersection Matrix AB 0FFFFFFF2 BA 0FFFFFFF2 B Int Bdy Ext Int 0 F F A Bdy F F F Ext F F 2
L/P		Intersection Matrix AB 0F1FF0FF2 BA 0FFFFF102 B Int Bdy Ext Int 0 F 1 A Bdy F F 0 Ext F F 2
L/L		Intersection Matrix AB 1FFF0FFF2 BA 1FFF0FFF2 B Int Bdy Ext Int 1 F F A Bdy F 0 F Ext F F 2
L/L		Intersection Matrix AB 101FF0FF2 BA 1FF0FF102 B Int Bdy Ext Int 1 0 1 A Bdy F F 0 Ext F F 2
L/L		Intersection Matrix AB 101F00FF2 BA 1FF00F102 B Int Bdy Ext Int 1 0 1 A Bdy F 0 0 Ext F F 2
S/P		Intersection Matrix AB 0F2FF1FF2 BA 0FFFFF212 B Int Bdy Ext Int 0 F 2 A Bdy F F 1 Ext F F 2

S/S		Intersection Matrix AB 2FFF1FFF2 BA 2FFF1FFF2 B Int Bdy Ext Int 2 F F A Bdy F 1 F Ext F F 2
S/S		Intersection Matrix AB 212FF1FF2 BA 2FF1FF212 B Int Bdy Ext Int 2 1 2 A Bdy F F 1 Ext F F 2
S/S		Intersection Matrix AB 212F01FF2 BA 2FF10F212 B Int Bdy Ext Int 2 1 2 A Bdy F 0 1 Ext F F 2
S/S		Intersection Matrix AB 212F11FF2 BA 2FF11F212 B Int Bdy Ext Int 2 1 2 A Bdy F 1 1 Ext F F 2

Overlaps [T*T***T**] (P/P, S/S), [1*T***T**] (L/L)

Relation	Schéma	Matrice
L/L		Intersection Matrix AB 0FFFFFFF2 BA 0FFFFFFF2 B Int Bdy Ext A Int 0 F F Bdy F F F Ext F F 2
L/L		Intersection Matrix AB 1F1FF0102 BA 1F1FF0102 B Int Bdy Ext A Int 1 F 1 Bdy F F 0 Ext 1 0 2
L/L		Intersection Matrix AB 1F1F0F1F2 BA 1F1F0F1F2 B Int Bdy Ext A Int 1 F 1 Bdy F 0 F Ext 1 F 2
L/L		Intersection Matrix AB 1F1F00102 BA 1F1F00102 B Int Bdy Ext A Int 1 F 1 Bdy F 0 0 Ext 1 0 2
L/L		Intersection Matrix AB 1F100F102 BA 101F001F2 B Int Bdy Ext A Int 1 F 1 Bdy 0 0 F Ext 1 0 2
L/L		Intersection Matrix AB 1F10F0102 BA 101FF0102 B Int Bdy Ext A Int 1 F 1 Bdy 0 F 0 Ext 1 0 2

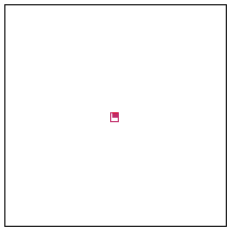
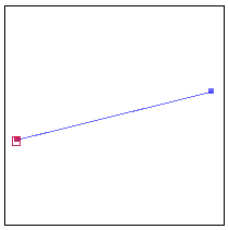
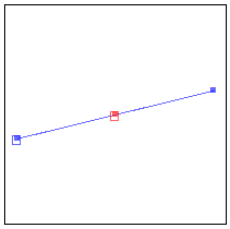
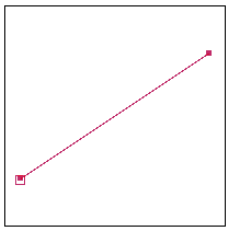
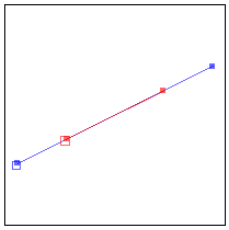
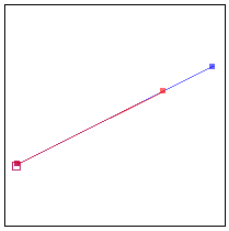
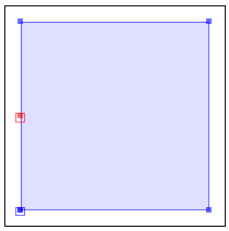
L/L		Intersection Matrix AB 1F10FF102 BA 101FF01F2 B Int Bdy Ext Int 1 F 1 A Bdy 0 F F Ext 1 0 2
L/L		Intersection Matrix AB 101FF01F2 BA 1F10FF102 B Int Bdy Ext Int 1 0 1 A Bdy F F 0 Ext 1 F 2
L/L		Intersection Matrix AB 101FF0102 BA 1F10F0102 B Int Bdy Ext Int 1 0 1 A Bdy F F 0 Ext 1 0 2
L/L		Intersection Matrix AB 101F001F2 BA 1F100F102 B Int Bdy Ext Int 1 0 1 A Bdy F 0 0 Ext 1 F 2
L/L		Intersection Matrix AB 1010FF1F2 BA 1010FF1F2 B Int Bdy Ext Int 1 0 1 A Bdy 0 F F Ext 1 F 2
L/L		Intersection Matrix AB 1010FF102 BA 1010F01F2 B Int Bdy Ext Int 1 0 1 A Bdy 0 F F Ext 1 0 2
L/L		Intersection Matrix AB 1010F01F2 BA 1010FF102 B Int Bdy Ext Int 1 0 1 A Bdy 0 F 0 Ext 1 F 2

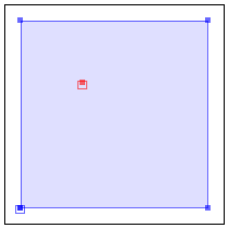
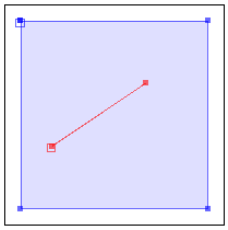
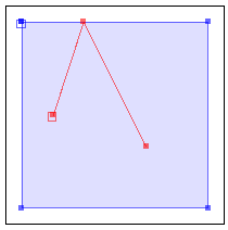
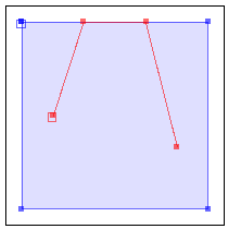
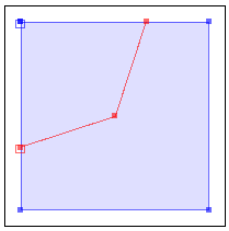
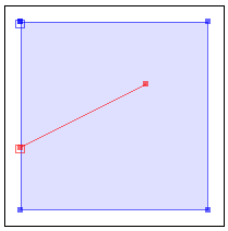
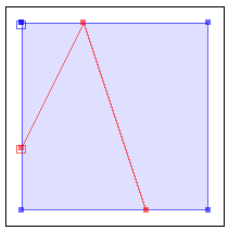
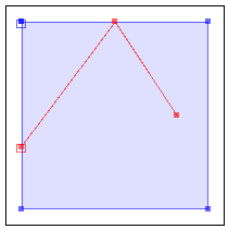
L/L		Intersection Matrix AB 1010F0102 BA 1010F0102 B Int Bdy Ext Int 1 0 1 A Bdy 0 F 0 Ext 1 0 2
L/L		Intersection Matrix AB 10100F1F2 BA 10100F1F2 B Int Bdy Ext Int 1 0 1 A Bdy 0 0 F Ext 1 F 2
S/S		Intersection Matrix AB 212111212 BA 212111212 B Int Bdy Ext Int 2 1 2 A Bdy 1 1 1 Ext 2 1 2
S/S		Intersection Matrix AB 212101212 BA 212101212 B Int Bdy Ext Int 2 1 2 A Bdy 1 0 1 Ext 2 1 2

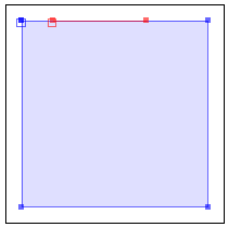
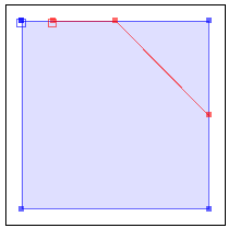
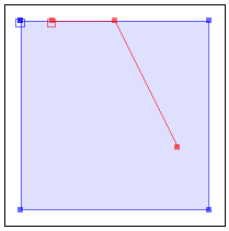
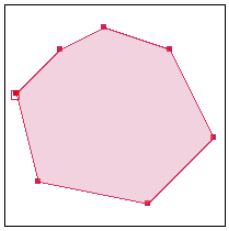
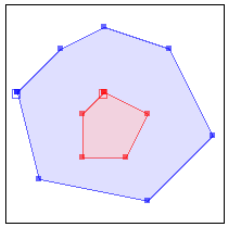
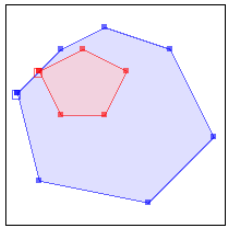
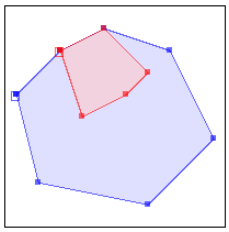
Intersects [T********] , [*T*******] , [***T*****] , [****T****]

(p.m.) : Le prédicat Intersects s'applique à toutes les relations différentes de Disjoint, dès que les objets ont au moins un point commun (intérieur ou limite).

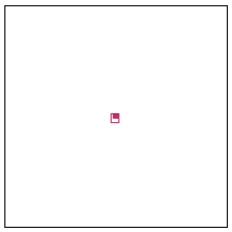
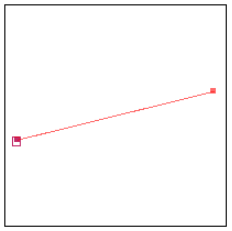
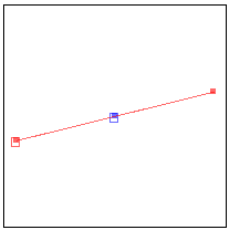
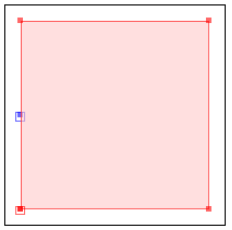
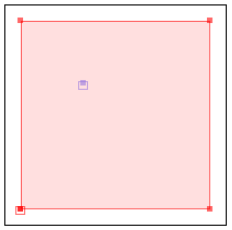
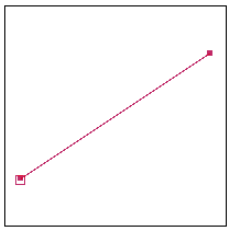
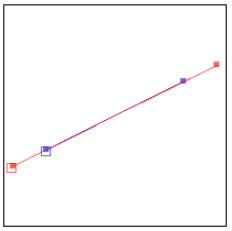
Covers [T*****FF*] , [*T****FF*] , [***T**FF*] , [****T*FF*]

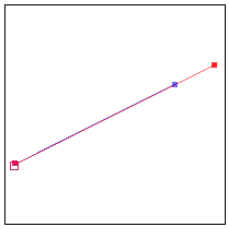
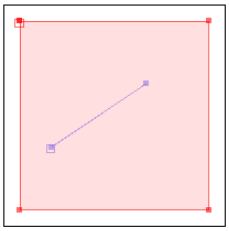
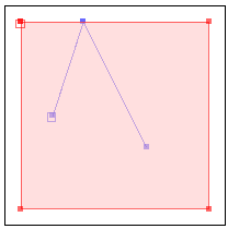
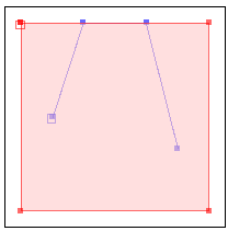
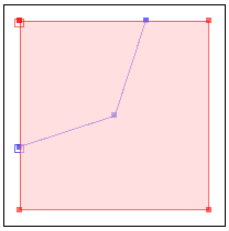
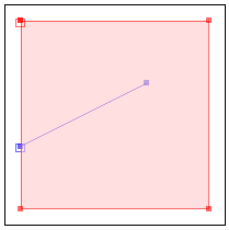
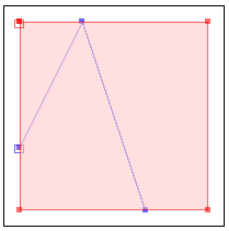
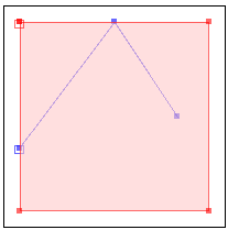
Relation	Schéma	Matrice
P/P		Intersection Matrix AB 0FFFFFFF2 BA 0FFFFFFF2 B Int Bdy Ext Int 0 F F A Bdy F F F Ext F F 2
L/P		Intersection Matrix AB FF10F0FF2 BA F0FFFF102 B Int Bdy Ext Int F F 1 A Bdy 0 F 0 Ext F F 2
L/P		Intersection Matrix AB 0F1FF0FF2 BA 0FFFFF102 B Int Bdy Ext Int 0 F 1 A Bdy F F 0 Ext F F 2
L/L		Intersection Matrix AB 1FFF0FFF2 BA 1FFF0FFF2 B Int Bdy Ext Int 1 F F A Bdy F 0 F Ext F F 2
L/L		Intersection Matrix AB 101FF0FF2 BA 1FF0FF102 B Int Bdy Ext Int 1 0 1 A Bdy F F 0 Ext F F 2
L/L		Intersection Matrix AB 101F00FF2 BA 1FF00F102 B Int Bdy Ext Int 1 0 1 A Bdy F 0 0 Ext F F 2
S/P		Intersection Matrix AB FF20F1FF2 BA F0FFFF212 B Int Bdy Ext Int F F 2 A Bdy 0 F 1 Ext F F 2

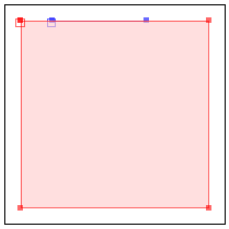
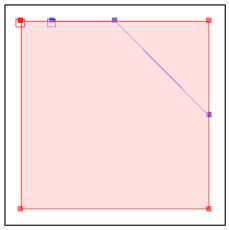
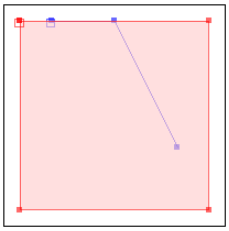
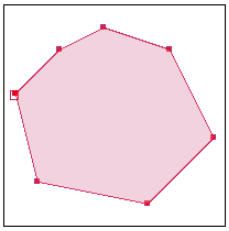
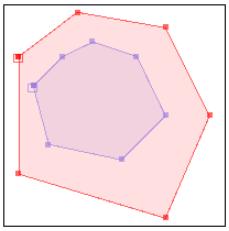
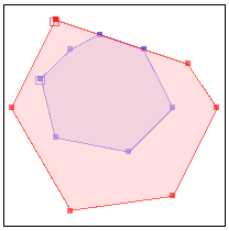
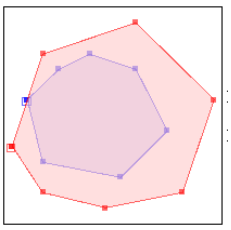
S/P		Intersection Matrix AB 0F2FF1FF2 BA 0FFFFF212 B Int Bdy Ext Int 0 F 2 A Bdy F F 1 Ext F F 2
S/L		Intersection Matrix AB 102FF1FF2 BA 1FF0FF212 B Int Bdy Ext Int 1 0 2 A Bdy F F 1 Ext F F 2
S/L		Intersection Matrix AB 1020F1FF2 BA 10F0FF212 B Int Bdy Ext Int 1 0 2 A Bdy 0 F 1 Ext F F 2
S/L		Intersection Matrix AB 1021F1FF2 BA 11F0FF212 B Int Bdy Ext Int 1 0 2 A Bdy 1 F 1 Ext F F 2
S/L		Intersection Matrix AB 1F2F01FF2 BA 1FFF0F212 B Int Bdy Ext Int 1 F 2 A Bdy F 0 1 Ext F F 2
S/L		Intersection Matrix AB 102F01FF2 BA 1FF00F212 B Int Bdy Ext Int 1 0 2 A Bdy F 0 1 Ext F F 2
S/L		Intersection Matrix AB 1F2001FF2 BA 10FF0F212 B Int Bdy Ext Int 1 F 2 A Bdy 0 0 1 Ext F F 2
S/L		Intersection Matrix AB 102001FF2 BA 10F00F212 B Int Bdy Ext Int 1 0 2 A Bdy 0 0 1 Ext F F 2

S/L		Intersection Matrix AB FF2101FF2 BA F1FF0F212 B Int Bdy Ext Int F F 2 A Bdy 1 0 1 Ext F F 2
S/L		Intersection Matrix AB 1F2101FF2 BA 11FF0F212 B Int Bdy Ext Int 1 F 2 A Bdy 1 0 1 Ext F F 2
S/L		Intersection Matrix AB 102101FF2 BA 11F00F212 B Int Bdy Ext Int 1 0 2 A Bdy 1 0 1 Ext F F 2
S/S		Intersection Matrix AB 2FFF1FFF2 BA 2FFF1FFF2 B Int Bdy Ext Int 2 F F A Bdy F 1 F Ext F F 2
S/S		Intersection Matrix AB 212FF1FF2 BA 2FF1FF212 B Int Bdy Ext Int 2 1 2 A Bdy F F 1 Ext F F 2
S/S		Intersection Matrix AB 212F01FF2 BA 2FF10F212 B Int Bdy Ext Int 2 1 2 A Bdy F 0 1 Ext F F 2
S/S		Intersection Matrix AB 212F11FF2 BA 2FF11F212 B Int Bdy Ext Int 2 1 2 A Bdy F 1 1 Ext F F 2

CoveredBy [T*F**F***] , [*TF**F***] , [**FT*F***] , [**F*TF***]

Relation	Schéma	Matrice
P/P		Intersection Matrix AB 0FFFFFFF2 BA 0FFFFFFF2 B Int Bdy Ext Int 0 F F A Bdy F F F Ext F F 2
P/L		Intersection Matrix AB F0FFFF102 BA FF10F0FF2 B Int Bdy Ext Int F 0 F A Bdy F F F Ext 1 0 2
P/L		Intersection Matrix AB 0FFFFF102 BA 0F1FF0FF2 B Int Bdy Ext Int 0 F F A Bdy F F F Ext 1 0 2
P/S		Intersection Matrix AB F0FFFF212 BA FF20F1FF2 B Int Bdy Ext Int F 0 F A Bdy F F F Ext 2 1 2
P/S		Intersection Matrix AB 0FFFFF212 BA 0F2FF1FF2 B Int Bdy Ext Int 0 F F A Bdy F F F Ext 2 1 2
L/L		Intersection Matrix AB 1FFF0FFF2 BA 1FFF0FFF2 B Int Bdy Ext Int 1 F F A Bdy F 0 F Ext F F 2
L/L		Intersection Matrix AB 1FF0FF102 BA 101FF0FF2 B Int Bdy Ext Int 1 F F A Bdy 0 F F Ext 1 0 2

L/L		Intersection Matrix AB 1FF00F102 BA 101F00FF2 B Int Bdy Ext Int 1 F F A Bdy 0 0 F Ext 1 0 2
L/S		Intersection Matrix AB 1FF0FF212 BA 102FF1FF2 B Int Bdy Ext Int 1 F F A Bdy 0 F F Ext 2 1 2
L/S		Intersection Matrix AB 10F0FF212 BA 1020F1FF2 B Int Bdy Ext Int 1 0 F A Bdy 0 F F Ext 2 1 2
L/S		Intersection Matrix AB 11F0FF212 BA 1021F1FF2 B Int Bdy Ext Int 1 1 F A Bdy 0 F F Ext 2 1 2
L/S		Intersection Matrix AB 1FFF0F212 BA 1F2F01FF2 B Int Bdy Ext Int 1 F F A Bdy F 0 F Ext 2 1 2
L/S		Intersection Matrix AB 1FF00F212 BA 102F01FF2 B Int Bdy Ext Int 1 F F A Bdy 0 0 F Ext 2 1 2
L/S		Intersection Matrix AB 10FF0F212 BA 1F2001FF2 B Int Bdy Ext Int 1 0 F A Bdy F 0 F Ext 2 1 2
L/S		Intersection Matrix AB 10F00F212 BA 102001FF2 B Int Bdy Ext Int 1 0 F A Bdy 0 0 F Ext 2 1 2

L/S		Intersection Matrix AB F1FF0F212 BA FF2101FF2 B Int Bdy Ext Int F 1 F A Bdy F 0 F Ext 2 1 2
L/S		Intersection Matrix AB 11FF0F212 BA 1F2101FF2 B Int Bdy Ext Int 1 1 F A Bdy F 0 F Ext 2 1 2
L/S		Intersection Matrix AB 11F00F212 BA 102101FF2 B Int Bdy Ext Int 1 1 F A Bdy 0 0 F Ext 2 1 2
S/S		Intersection Matrix AB 2FFF1FFF2 BA 2FFF1FFF2 B Int Bdy Ext Int 2 F F A Bdy F 1 F Ext F F 2
S/S		Intersection Matrix AB 2FF1FF212 BA 212FF1FF2 B Int Bdy Ext Int 2 F F A Bdy 1 F F Ext 2 1 2
S/S		Intersection Matrix AB 2FF11F212 BA 212F11FF2 B Int Bdy Ext Int 2 F F A Bdy 1 1 F Ext 2 1 2
S/S		Intersection Matrix AB 2FF10F212 BA 212F01FF2 B Int Bdy Ext Int 2 F F A Bdy 1 0 F Ext 2 1 2

Conclusion

L'étude des relations topologiques normalisées entre objets géométriques dans un espace à deux dimensions montre que le choix des prédicats topologiques est plus large dans le domaine des logiciels et des bases de données spatiales conformes à l'OGC qu'avec les logiciels SIG précurseurs tels que MapInfo®.

Il est ainsi possible, dans la base de données PostGreSQL et sa cartouche spatiale PostGis, de régler précisément les filtres spatiaux à l'aide des matrices de Clementini afin de mettre en oeuvre des requêtes spatiales adaptées aux interrogations de l'utilisateur des systèmes d'information géographique.

Ce n'est pas encore le cas pour QGIS qui présente toutefois depuis sa version 1.6 l'accès aux 8 prédicats topologiques de l'OGC, sans la possibilité pour le moment d'utiliser le prédicat général Relate qui offre cette richesse fonctionnelle remarquable.

Il faut cependant avancer prudemment dans cette direction, car l'homonymie de certains prédicats (Contains, Within) qui ne produisent pas les mêmes résultats qunad on les applique aux mêmes jeux de données dans QGIS et dans MapInfo® ainsi que la négation du rôle des centroïdes des objets géographiques dans les relations spatiales OGC impliquent un changement méthodologique dans l'utilisation des requêtes spatiales, évolution pour laquelle il conviendra d'accompagner les utilisateurs.

C'est pour éviter cette confusion et les erreurs graves qui en résulteraient lors des traitements d'analyse spatiale effectués par les services que le périmètre fonctionnel retenu pour le déploiement de QGIS dans les services du MEDDTL et du MAAPRAT n'inclut pas aujourd'hui l'utilisation de l'extension Requête Spatiale qui utilise les prédicats spatiaux de l'OGC.
L'emploi des opérateurs géographiques normalisés s'imposera néanmoins dans un proche avenir.

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MEDDTL/SG/SPSSI/PSI1
septembre 2011

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