# Construction d'une Ontologie pour le Domaine d'Oncologie

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***Résumé-*** ***Ce rapport présente notre démarche de la conception et du développement d'une ontologie désignée au domaine d'oncologie, par le biais de la plateforme Amine. Le but est de représenter ce domaine incluent les différents agents au sein d'un centre d'oncologie, les différents départements, les symptômes d'un cancer chez un patient, les diagnostics et les traitements possibles, les outils utilisés etc.***

***Nous allons commencer par la construction d'une représentation de la taxonomie d'Oncologie, puis l'identification des concepts, relations, individus et situations, en ajoutant des définitions et des canons. Ensuite on va réaliser des graphs conceptuels sur la plateforme et leur appliquer quelques opérations comme la généralisation, la jointure, la projection, et la contraction. Après on va élaborer l'inférence basée sur la mémoire pour tester la notion du déduction, d'abduction et d'analogie. Et enfin on va terminer avec la réalisation d'un processus sur Amine.***

## I.Introduction

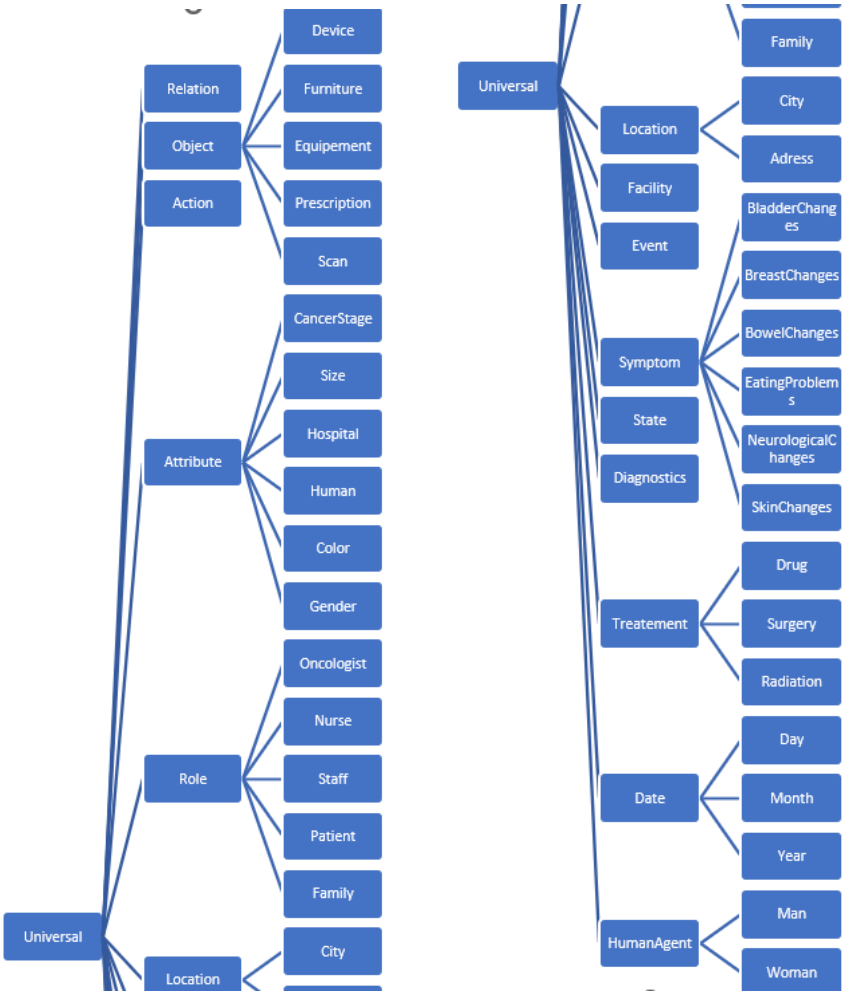
Une ontologie est une représentation explicite formelle de concepts dans un domaine, les propriétés de chaque concept décrivent les caractéristiques et les attributs du concept connus sous le nom de slots et les contraintes sur ces dernières fentes. Dans notre création d'ontologie, nous avons développé une ontologie dans le domaine de la santé, en particulier nous avons choisi l'ontologie du cancer création, et on a choisi l'anglais comme langue principale.

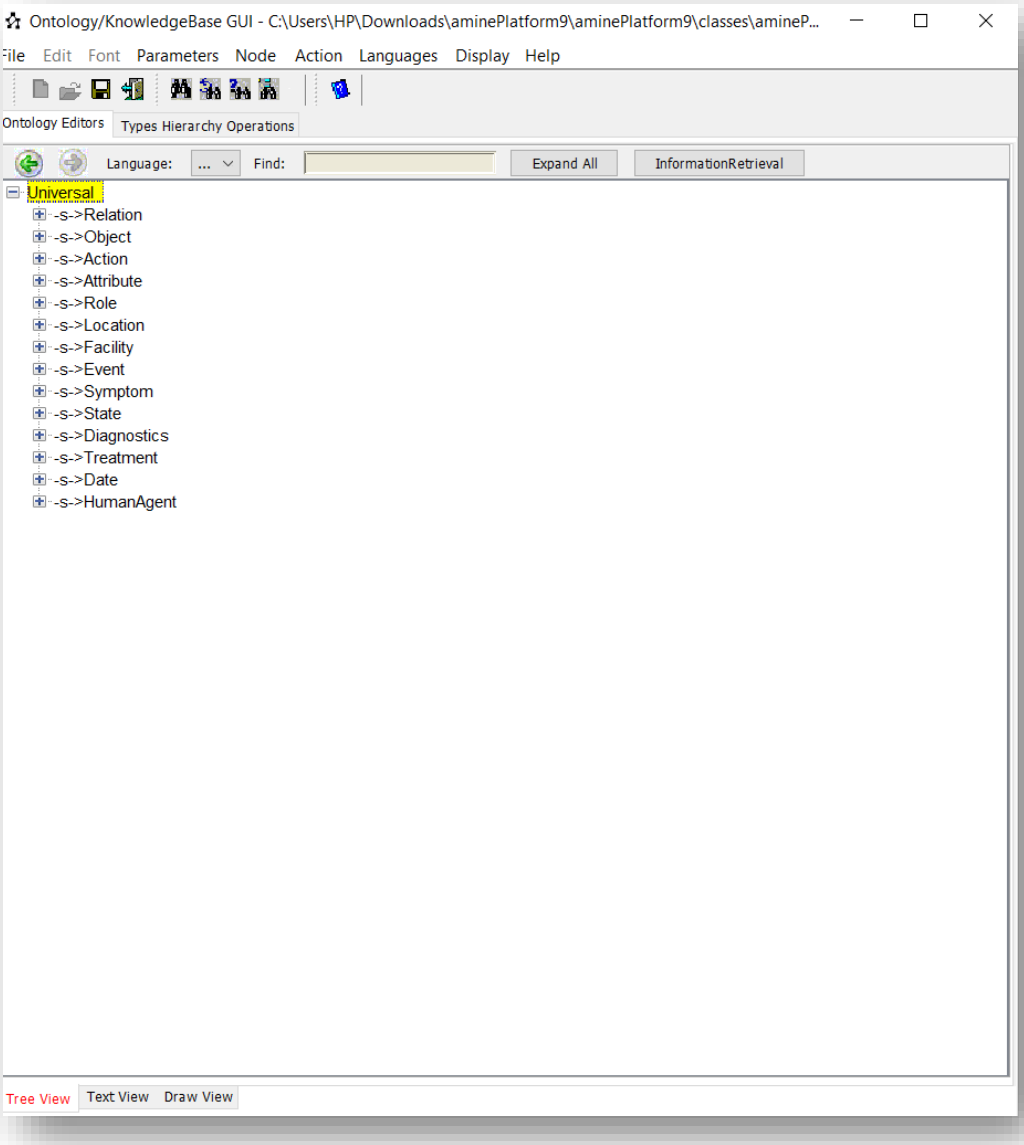
## II.Taxonomie

La première étape pour la construction de la taxonomie est l'extraction des entités qu'on aura besoin, ou plus précisément les concepts de notre domaine.

| Concepts | | | |
|---|---|---|---|
| Oncologist | Symptoms | Surgery | Date |
| Nurse | Diagnostics | Radiation | Cancer Stage |
| Patient | Treatment | Conferences | State |
| Family | Clinical Devices | Training | Paramedics |
| Staff | Furniture | Location | End of Life Care |

Une fois avoir idée générale sur les concepts, on a construit la hiérarchie entre les classes :

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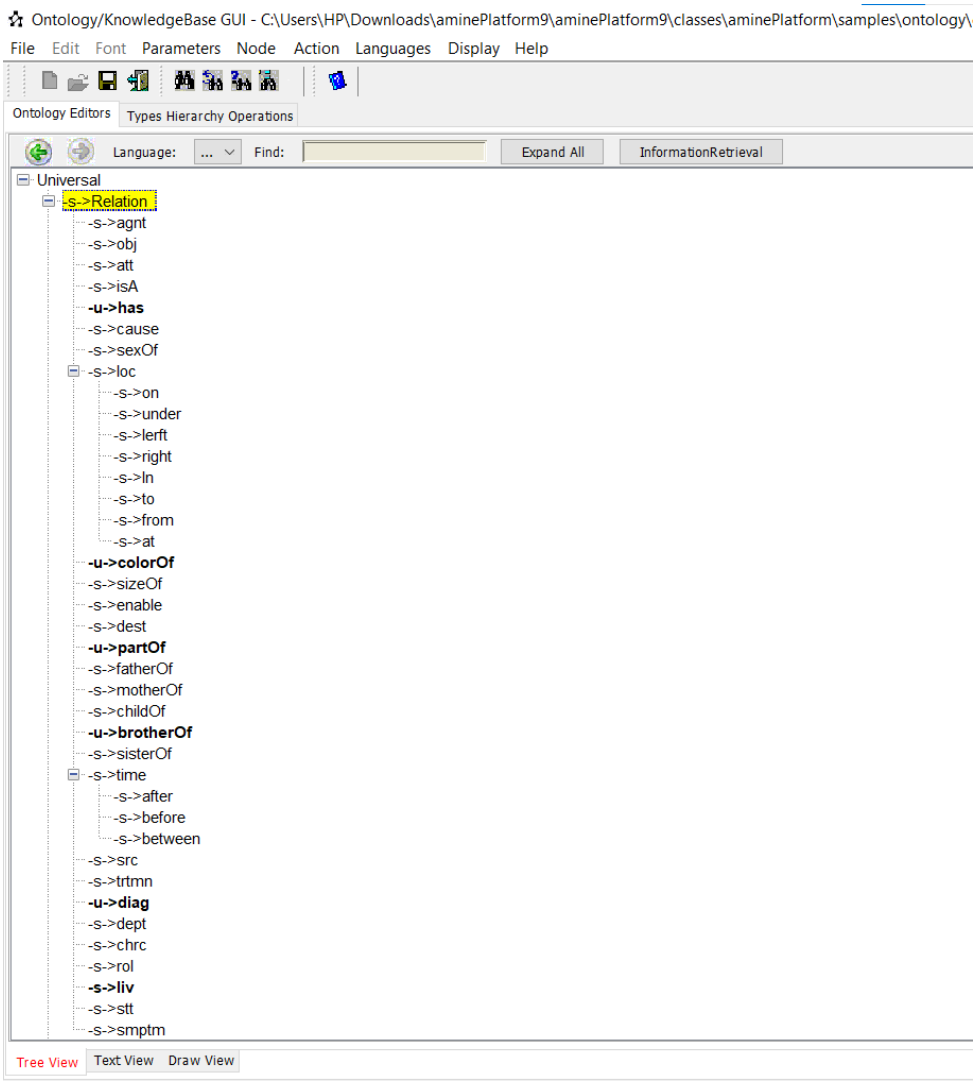
-s->Attribute
-s->Role
-s->Location
-s->Facility
-s->Event
-s->Symptom
-s->State
-s->Diagnostics
-s->Treatment
-s->Date
-s->HumanAgent
Tree View
Text View
Draw View

# III.Ontologie

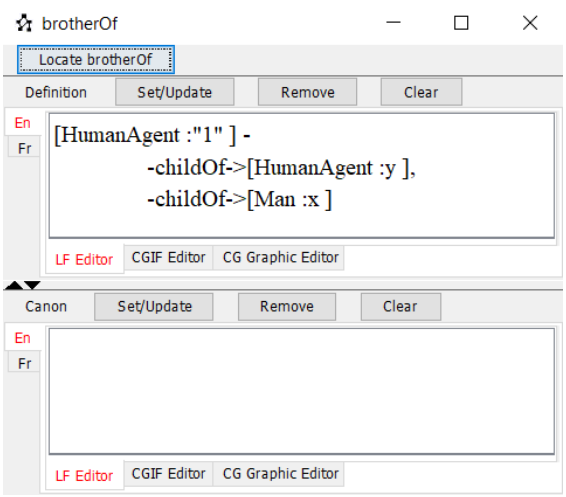
Maintenant on va construire notre ontologie en enrichissant chaque classe avec des sous-classes, en ajoutant des définitions, des canons, des situations et des règles.

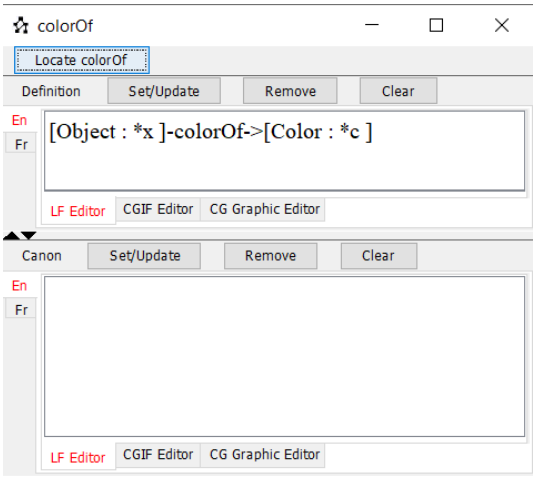
Par la suite on va explorer chaque concept à part.

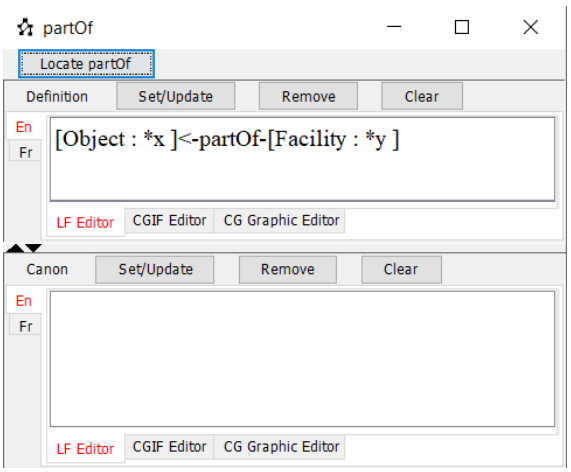
## 1. Relation

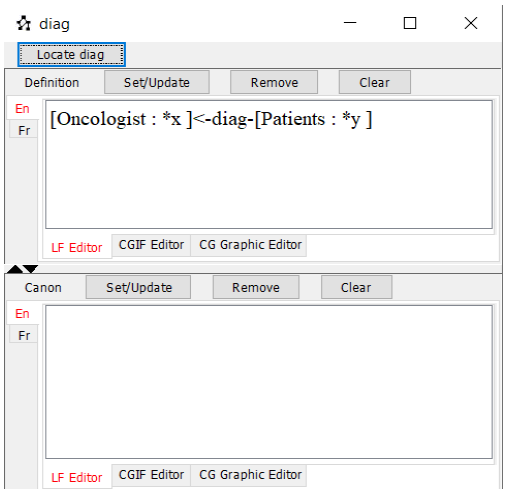


- *Définitions*

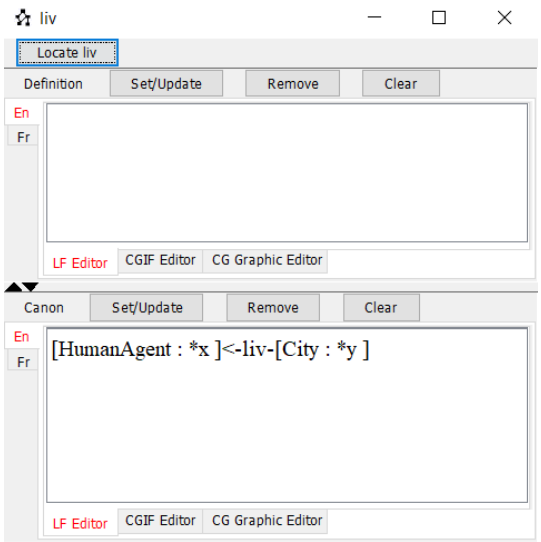


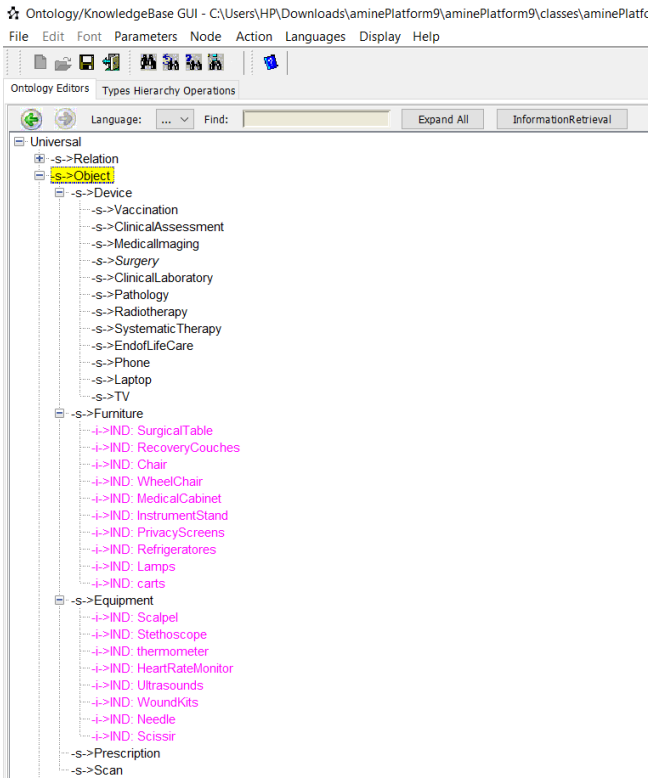



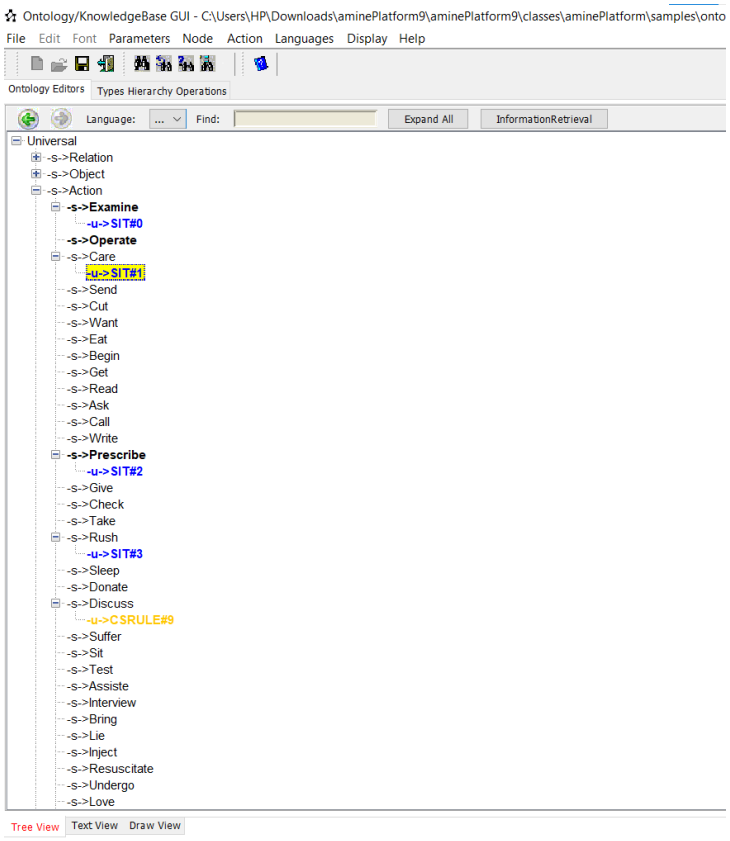

- *Canon*



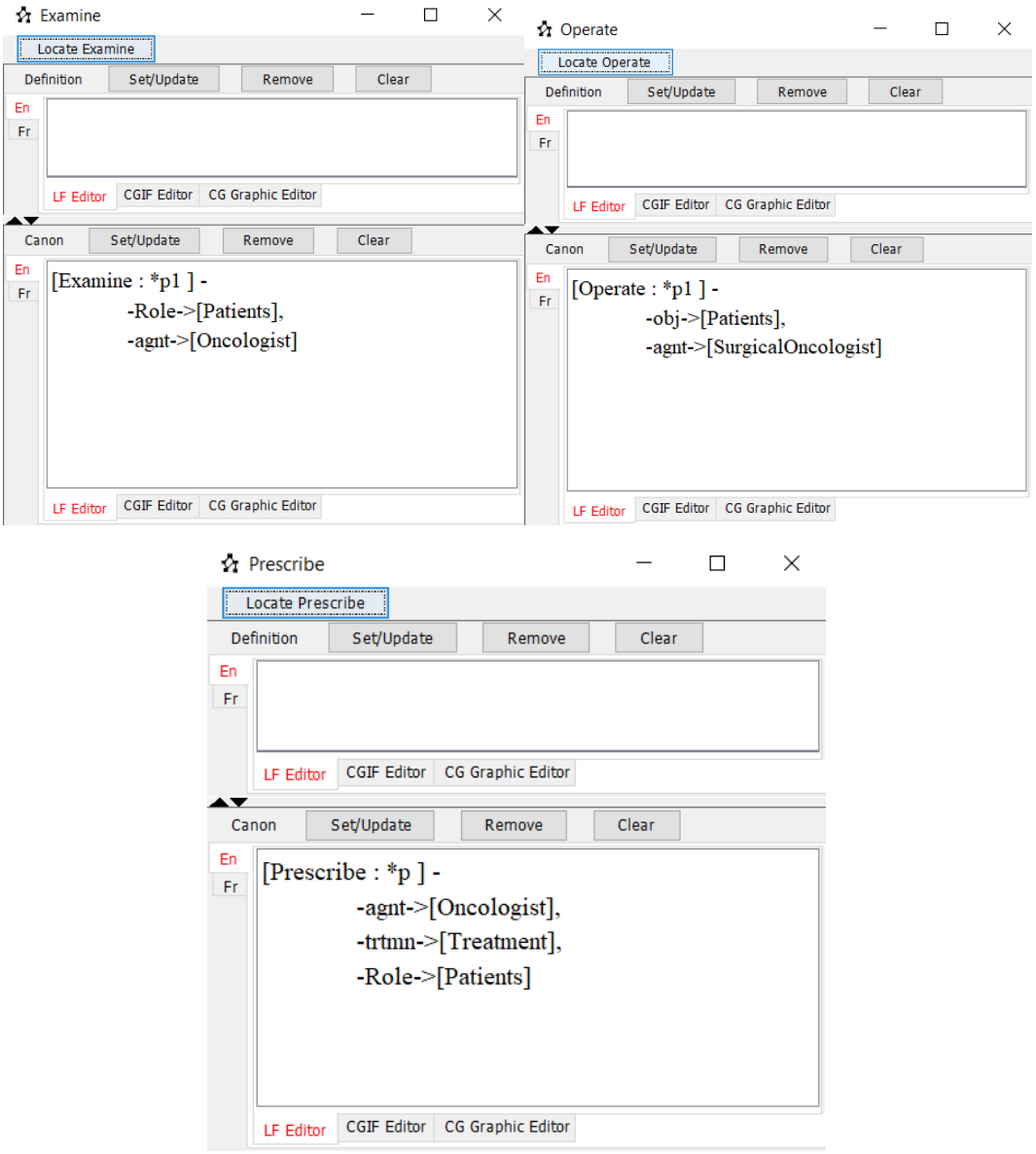
## 2. Object



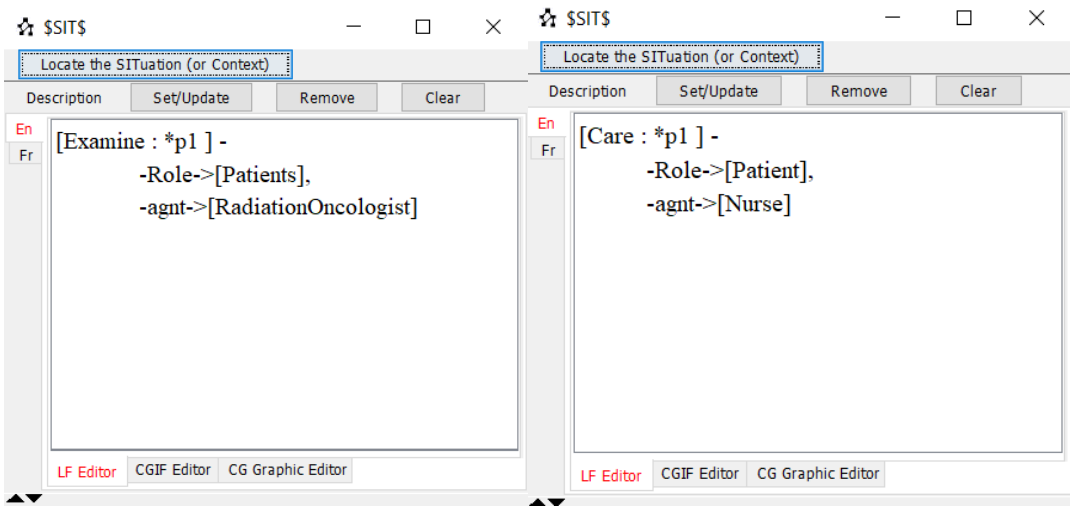

## 3. Action

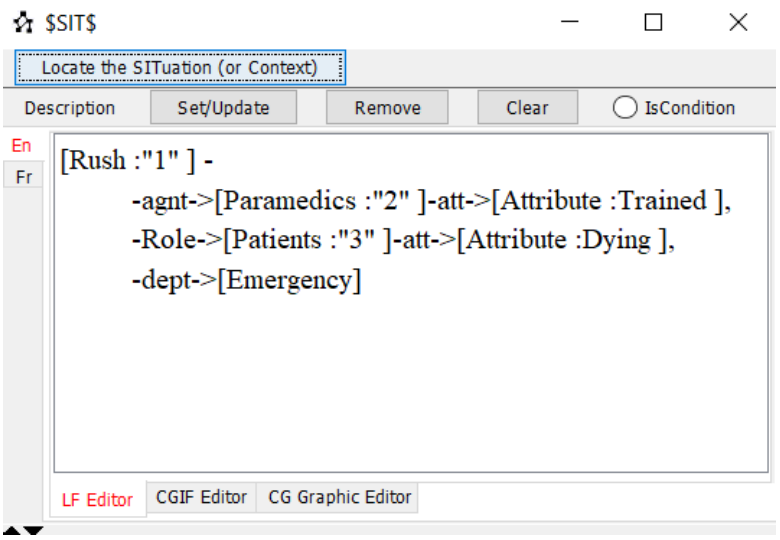


- *Canons*




- *Situations*

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[Rush :"1" ] -
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-Role->[Patients :"3" ]-att->[Attribute :Dying ],
-dept->[Emergency]
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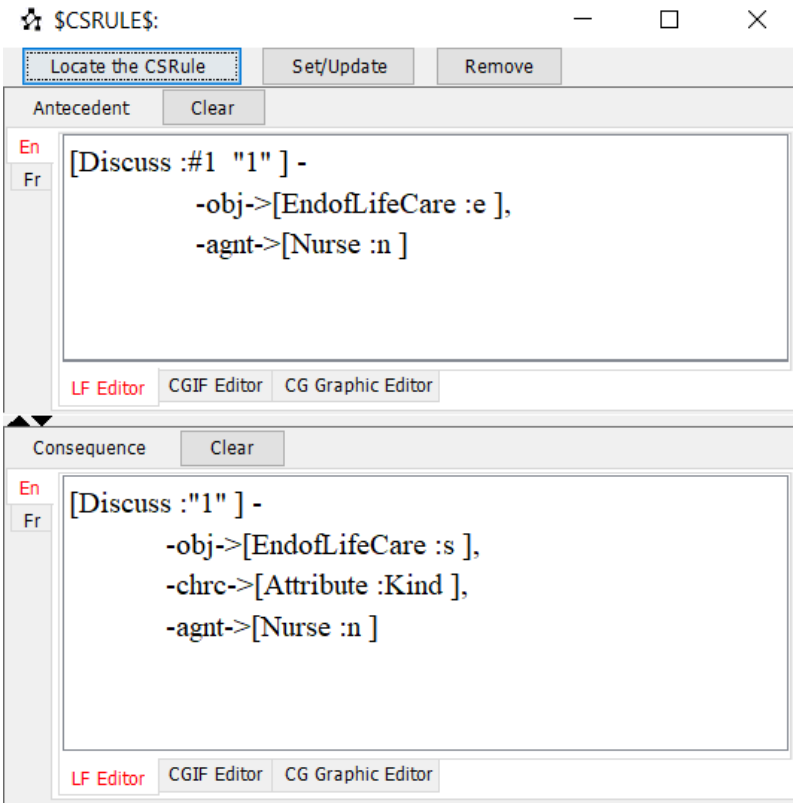
CG Graphic Editor

- *Règle*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CGIF Editor
CG Graphic Editor
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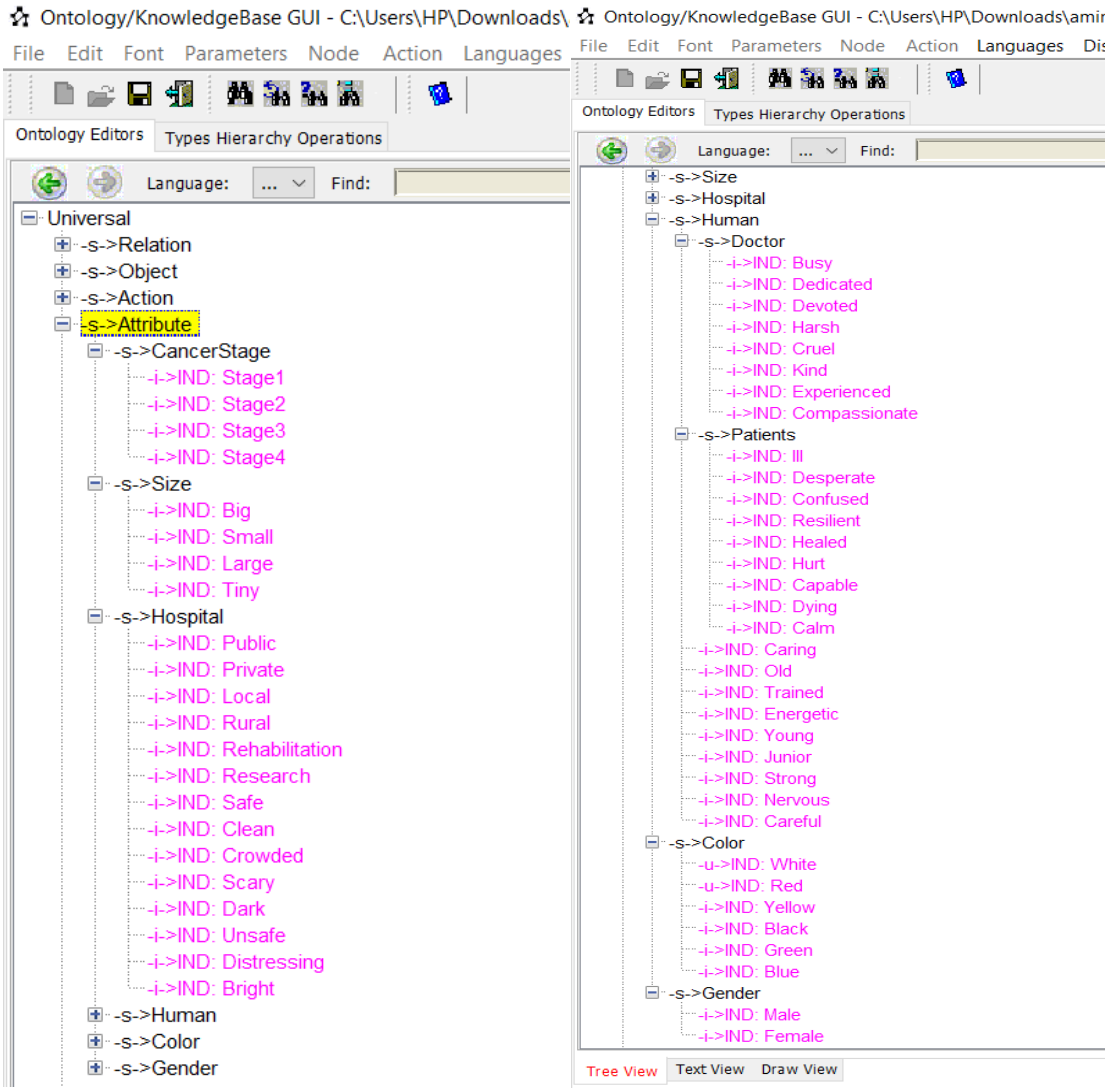
[Discuss :"1" ] -
-obj->[EndofLifeCare :s ],
-chrc->[Attribute :Kind ],
-agnt->[Nurse :n ]
LF Editor
CGIF Editor
CG Graphic Editor

## 4. Attribute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-s->Relation
-s->Object
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-s->Attribute
-s->CancerStage
-i->IND: Stage1
-i->IND: Stage2
-i->IND: Stage3
-i->IND: Stage4
-s->Size
-i->IND: Big
-i->IND: Small
-i->IND: Large
-i->IND: Tiny
-s->Hospital
-i->IND: Public
-i->IND: Private
-i->IND: Local
-i->IND: Rural
-i->IND: Rehabilitation
-i->IND: Research
-i->IND: Safe
-i->IND: Clean
-i->IND: Crowded
-i->IND: Scary
-i->IND: Dark
-i->IND: Unsafe
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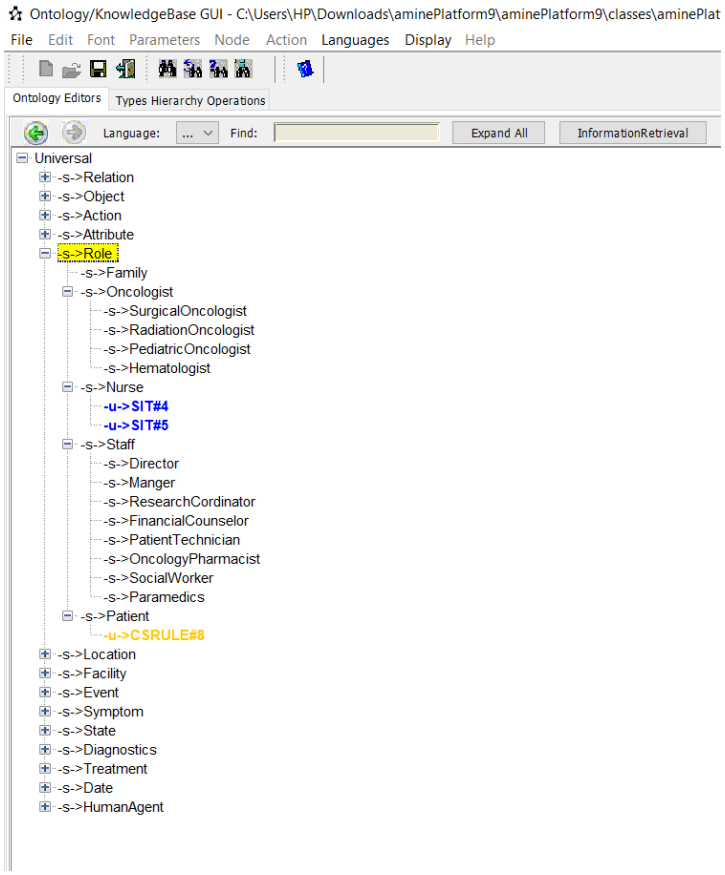
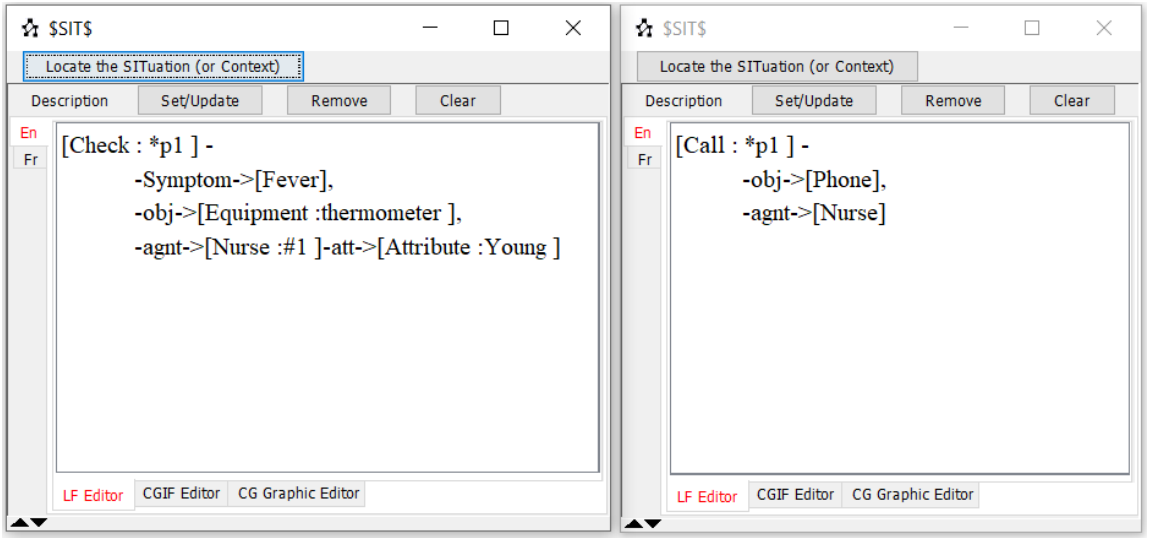
-i->IND: Devoted
-i->IND: Harsh
-i->IND: Cruel
-i->IND: Kind
-i->IND: Experienced
-i->IND: Compassionate
-s->Patients
-i->IND: Ill
-i->IND: Desperate
-i->IND: Confused
-i->IND: Resilient
-i->IND: Healed
-i->IND: Hurt
-i->IND: Capable
-i->IND: Dying
-i->IND: Calm
-i->IND: Caring
-i->IND: Old
-i->IND: Trained
-i->IND: Energetic
-i->IND: Young
-i->IND: Junior
-i->IND: Strong
-i->IND: Nervous
-i->IND: Careful
-s->Color
-u->IND: White
-u->IND: Red
-i->IND: Yellow
-i->IND: Black
-i->IND: Green
-i->IND: Blue
-s->Gender
-i->IND: Male
-i->IND: Female
Tree View
Text View
Draw View

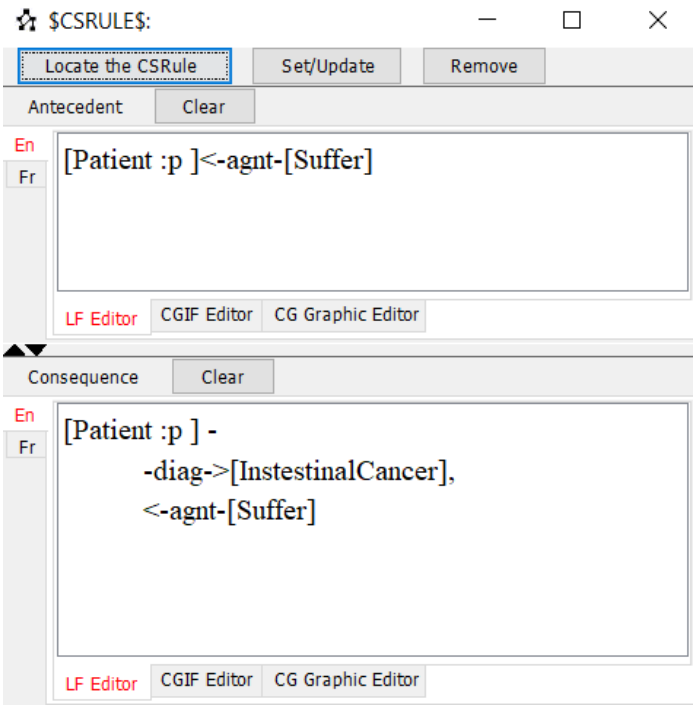
## 5. Rôle



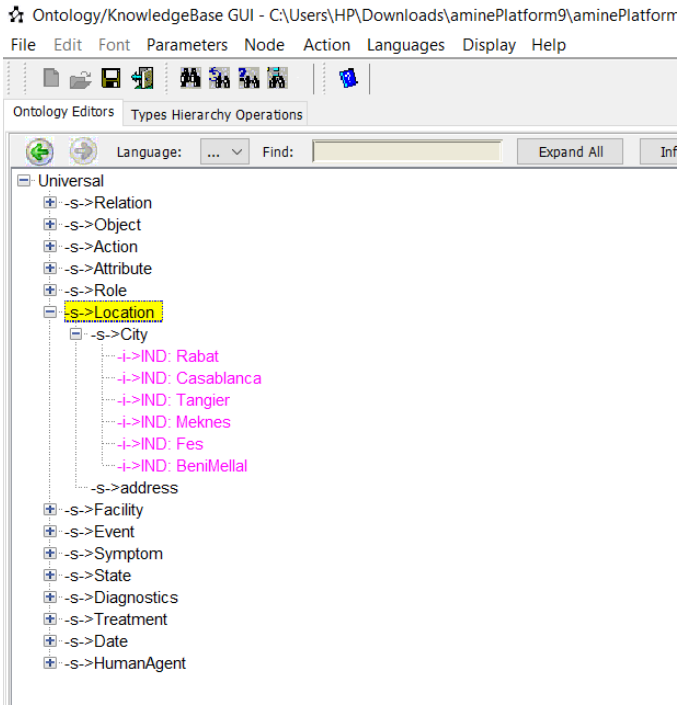

- *Situations*



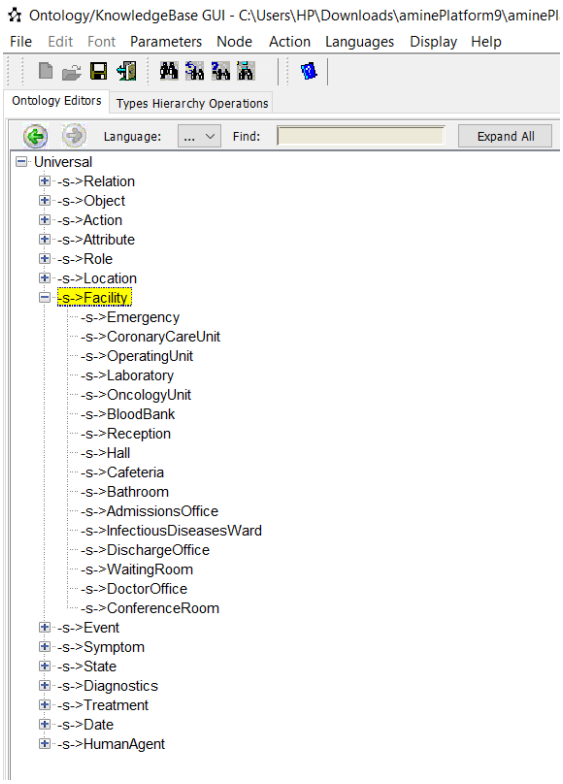
- *Règle*



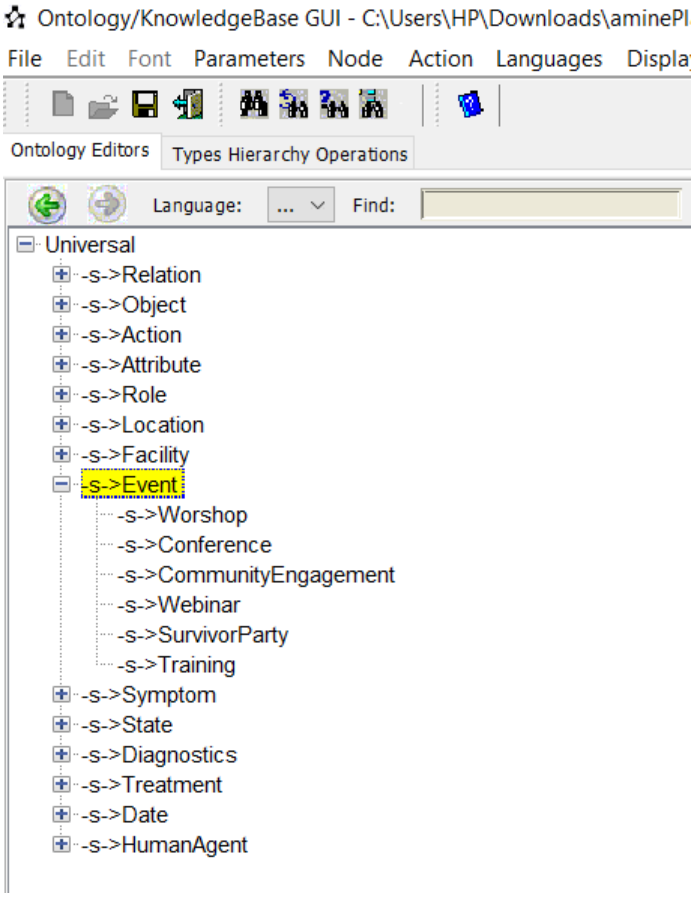

## 6. Location



## 7. Facility




## 8. Event



## 9. Symptoms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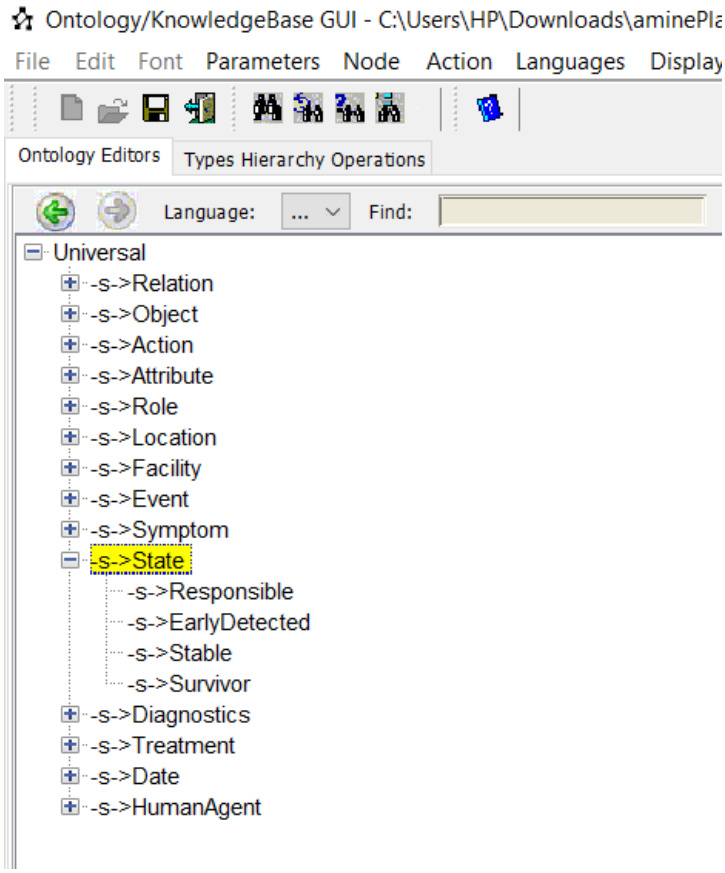
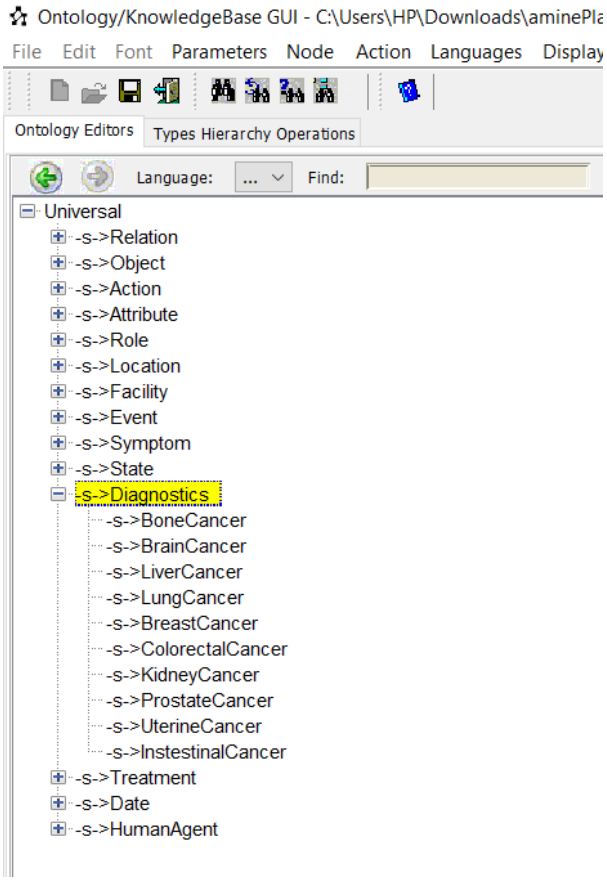
Ontology Editors
Types Hierarchy Operations
Language:
Find:
Expand All
-s->Event
-s->Symptom
-s->BladderChanges
-i->IND: TroubleUrinating
-i->IND: Pain
-u->IND: Blood
-s->BreastChanges
-i->IND: Lump
-i->IND: NippleChanges
-i->IND: Skin
-s->BowelChanges
-i->IND: Blood
-s->EatingProblems
-i->IND: BellyPain
-i->IND: Nausea
-i->IND: Vomiting
-i->IND: AppetieChanges
-s->MouthChanges
-i->IND: White
-i->IND: Red
-i->IND: Tongue
-s->NeurologicalChanges
-i->IND: Headaches
-i->IND: Seizures
-i->IND: VisionChanges
-i->IND: HearingChanges
-i->IND: DroopingFace
-s->SkinChanges
-i->IND: Mole
-i->IND: Sore
-i->IND: Jaundice
-s->WeightChanges
-s->Fatigue
-s->Cough
-s->Bleeding
-s->Fever
-s->Swelling
-s->HairLoss
-s->State
-s->Diagnostics
-s->Treatment
Tree View
Text View
Draw View

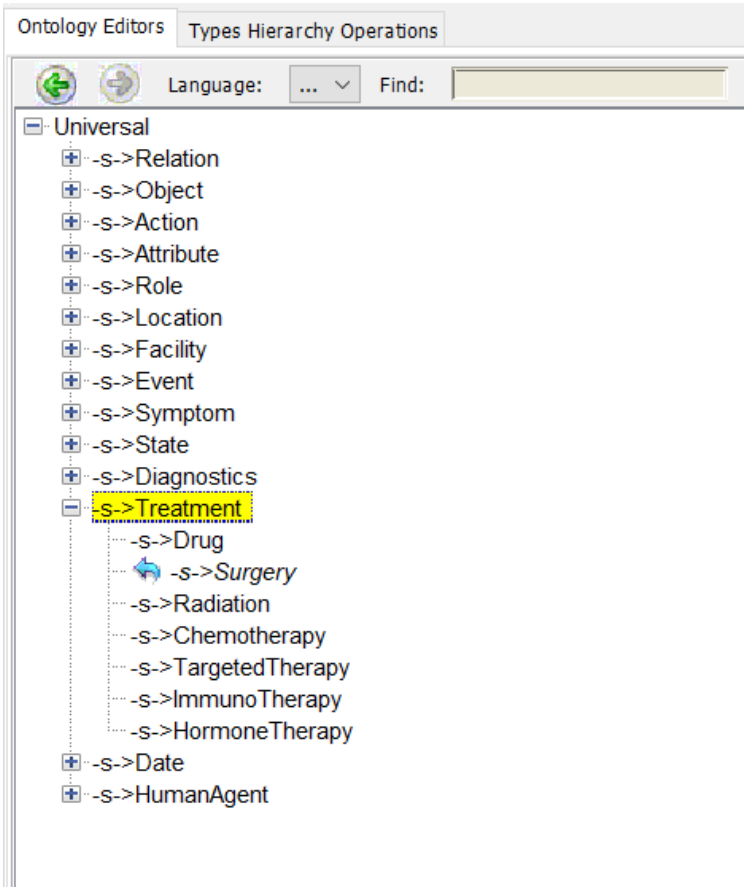
## 10. State



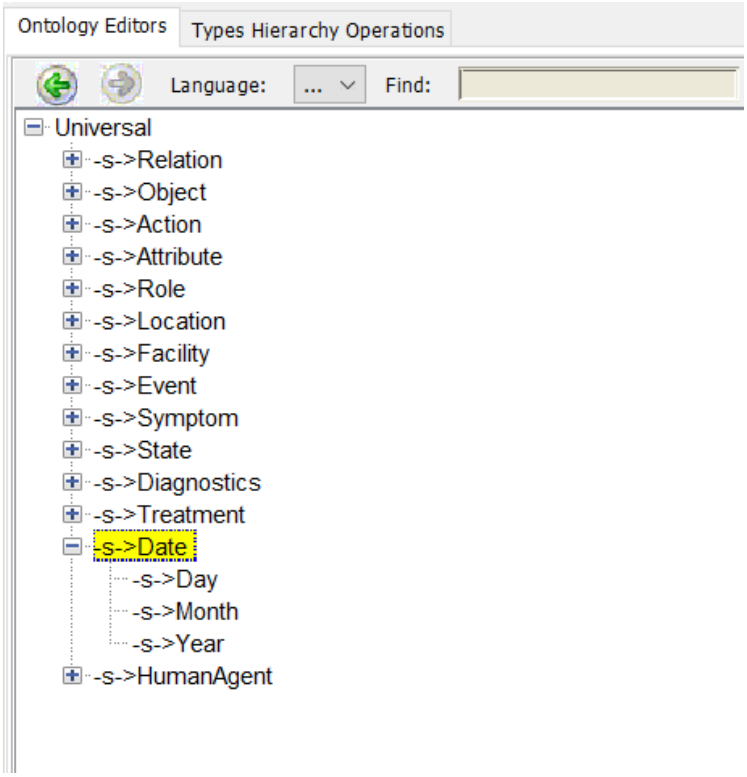

## 11. Diagnostics



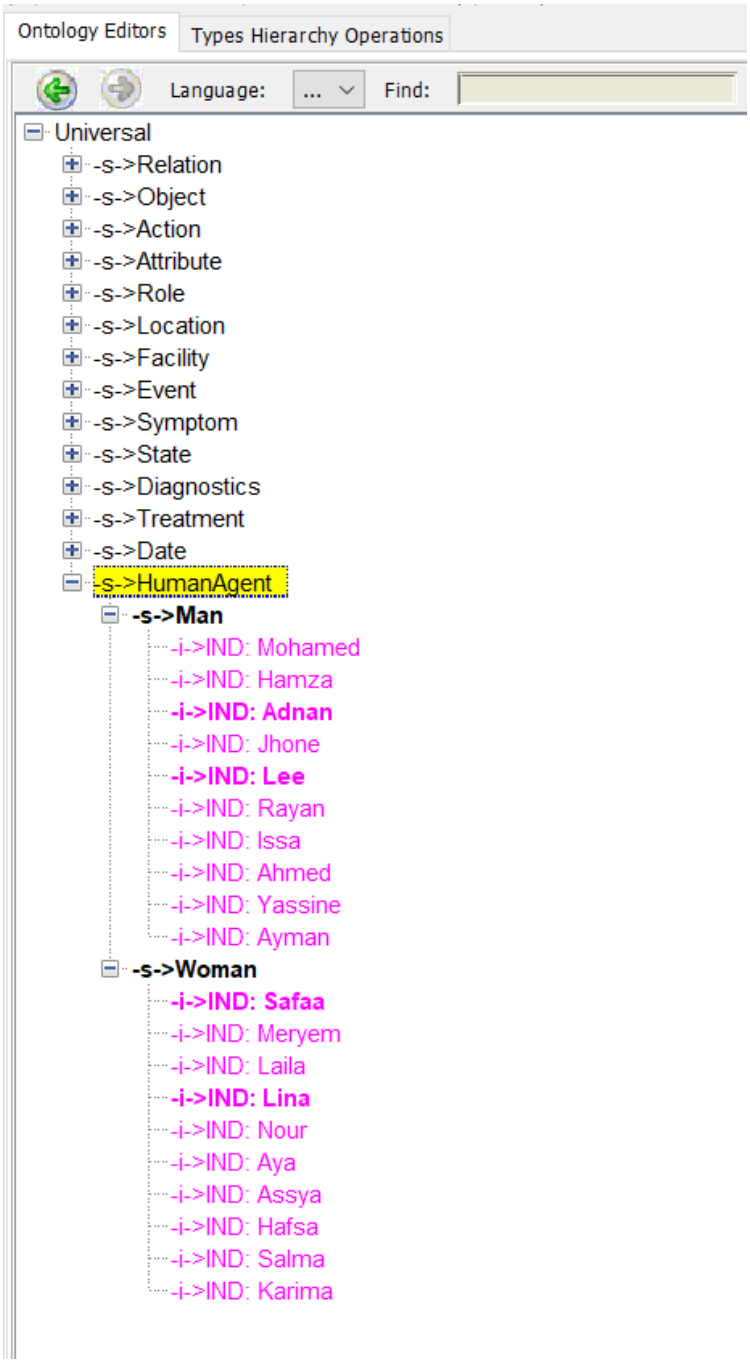
## 12. Treatment




## 13. Date



## 14. HumanAgent



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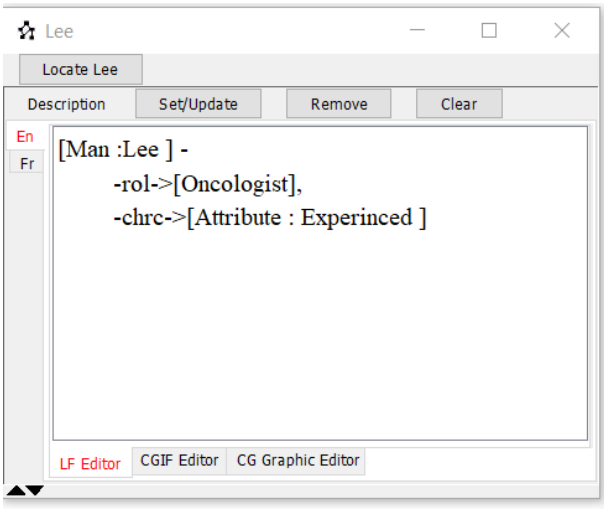
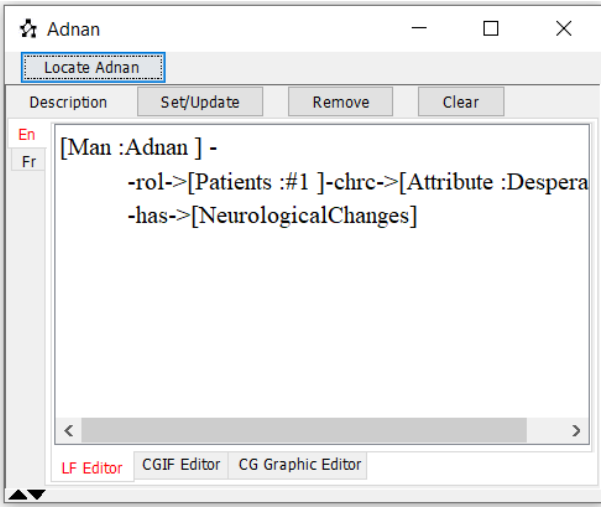
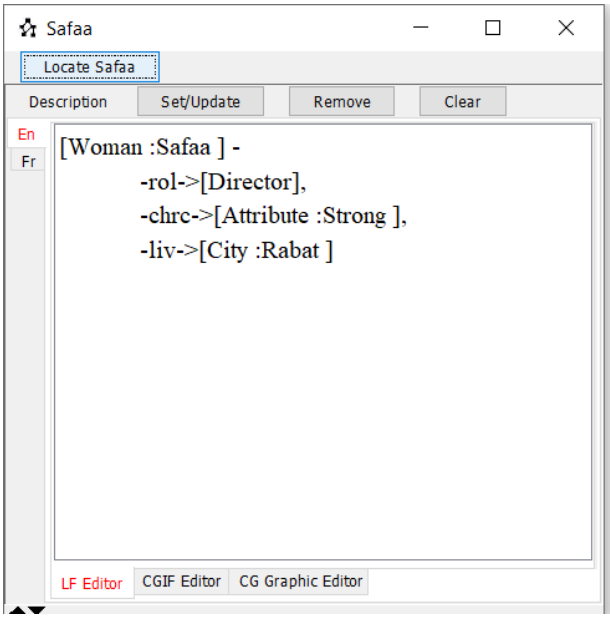
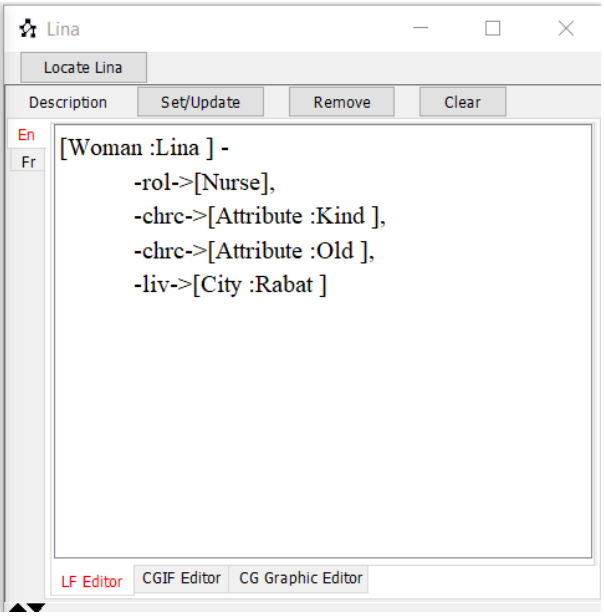
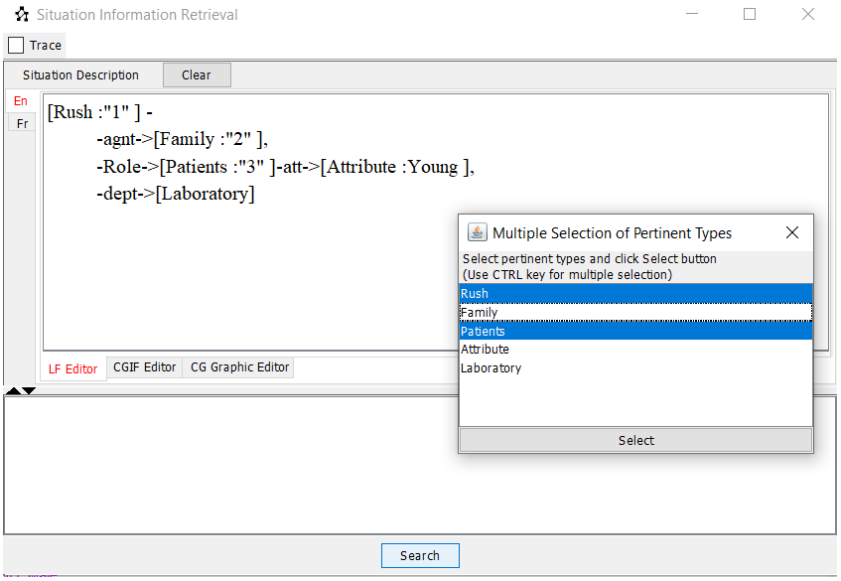


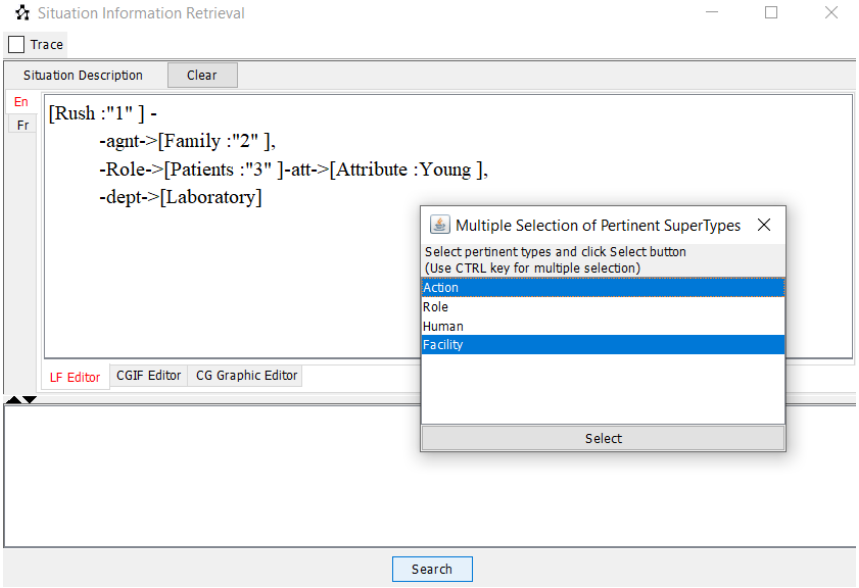



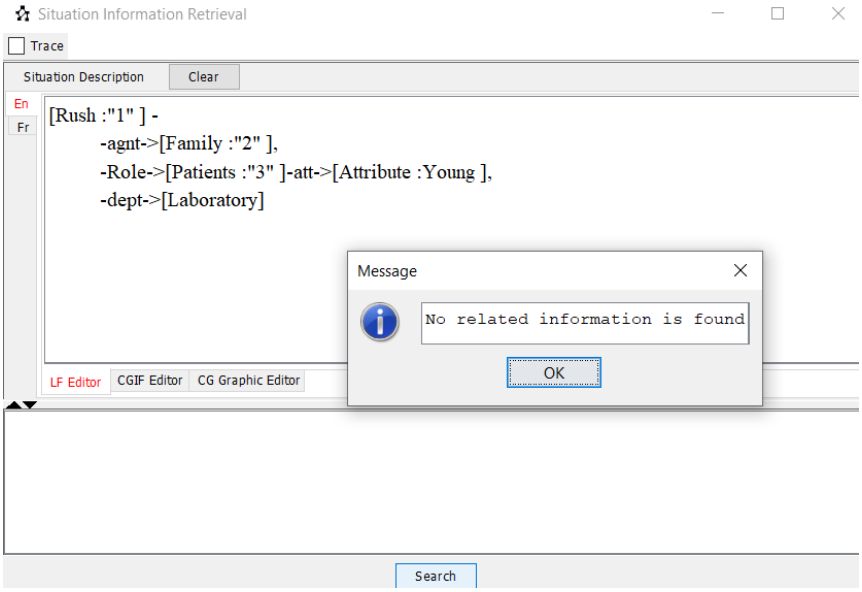



# 15. Information Retrieval



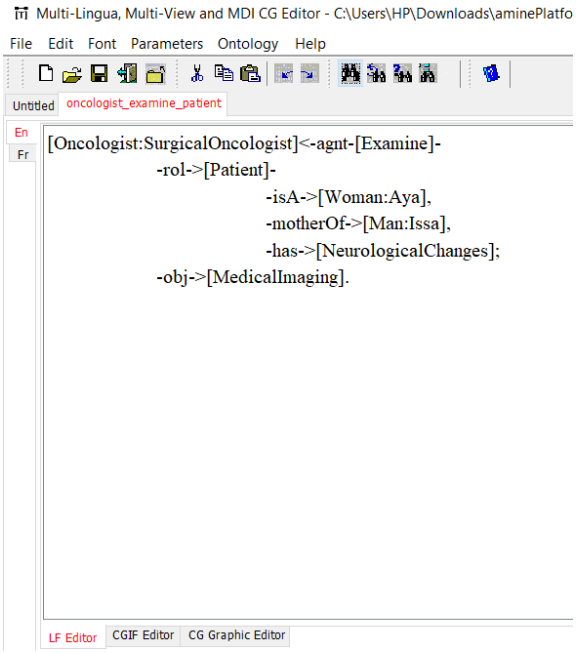



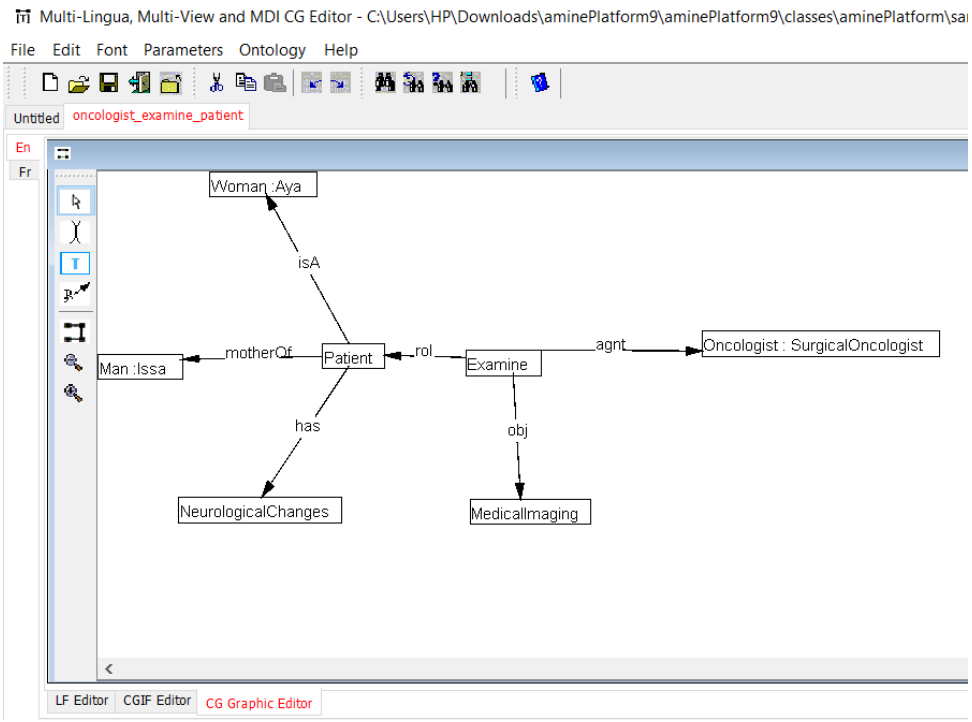



# IV.Graphs Conceptuels

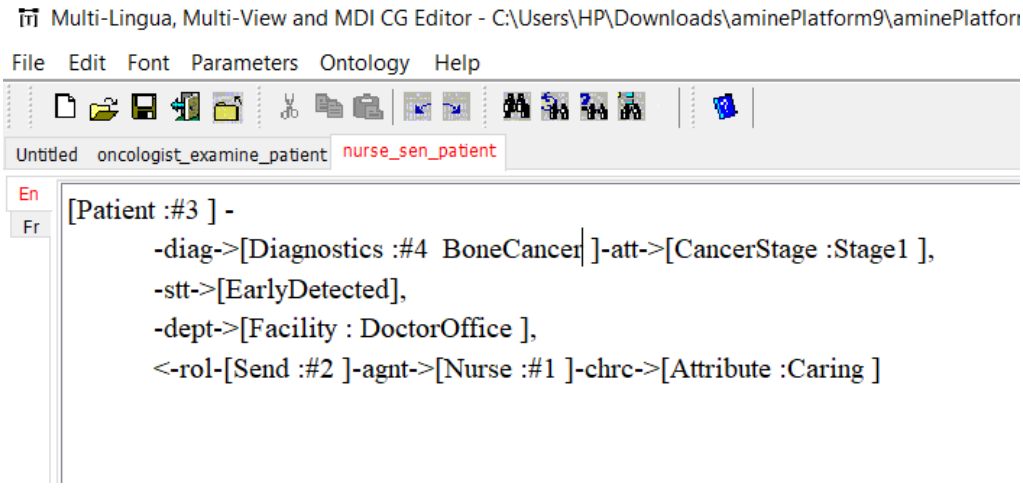
Dans cette section on va construire nos graphs conceptuels, et leur appliquer quelques opérations.

1. *Graph1*



2. *Graph2*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En
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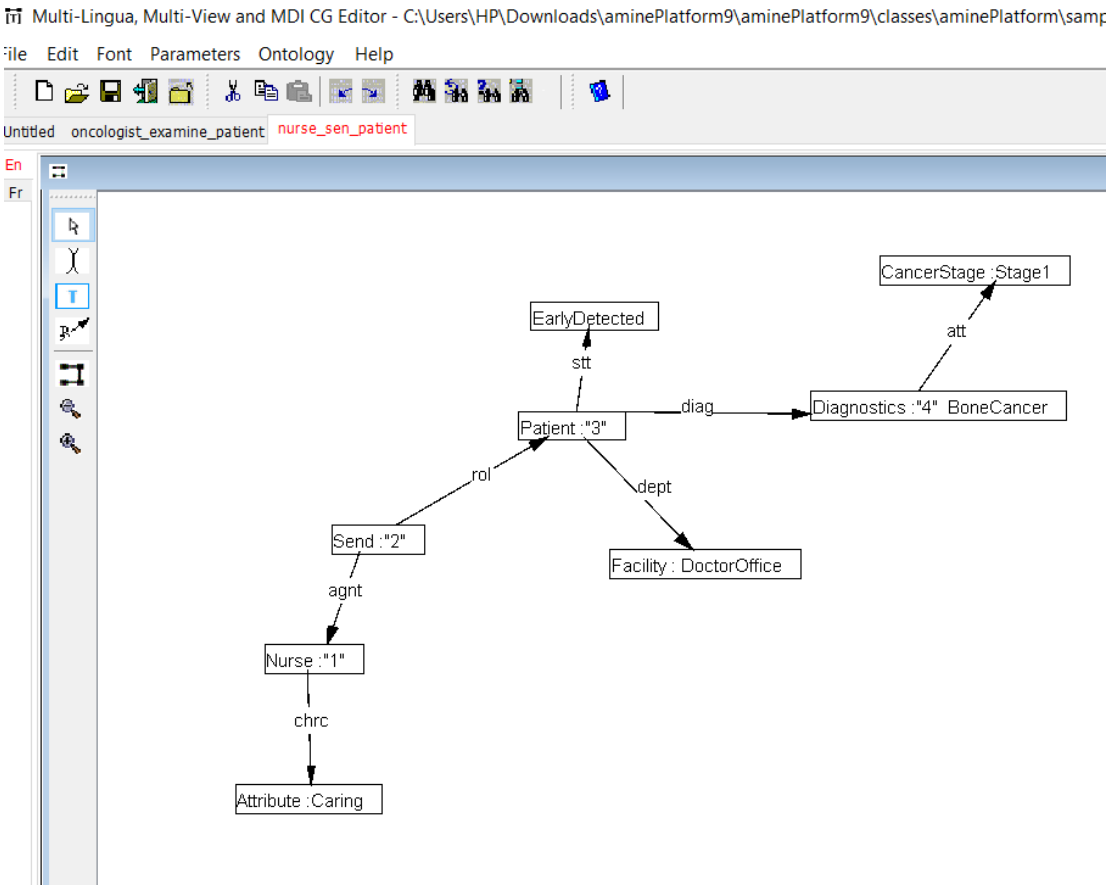
[Patient :#3 ] -
-diag->[Diagnostics :#4 BoneCancer ]-att->[CancerStage :Stage1 ],
-stt->[EarlyDetected],
-dept->[Facility : DoctorOffice ],
<-rol-[Send :#2 ]-agnt->[Nurse :#1 ]-chrc->[Attribute :Caring ]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Patient :"3"
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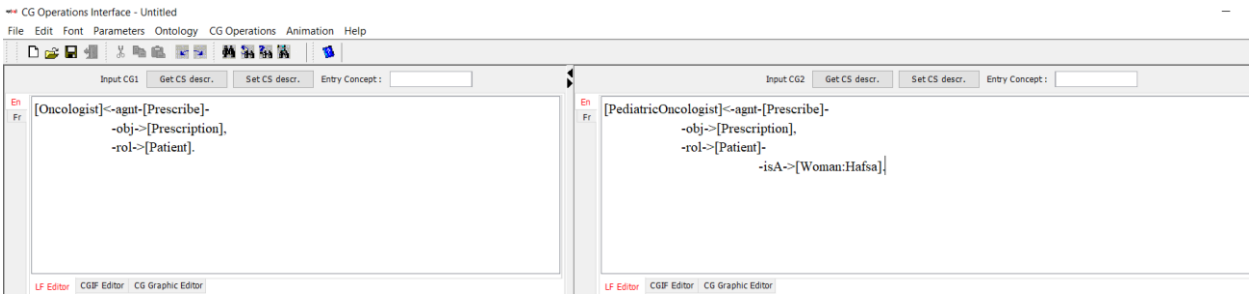
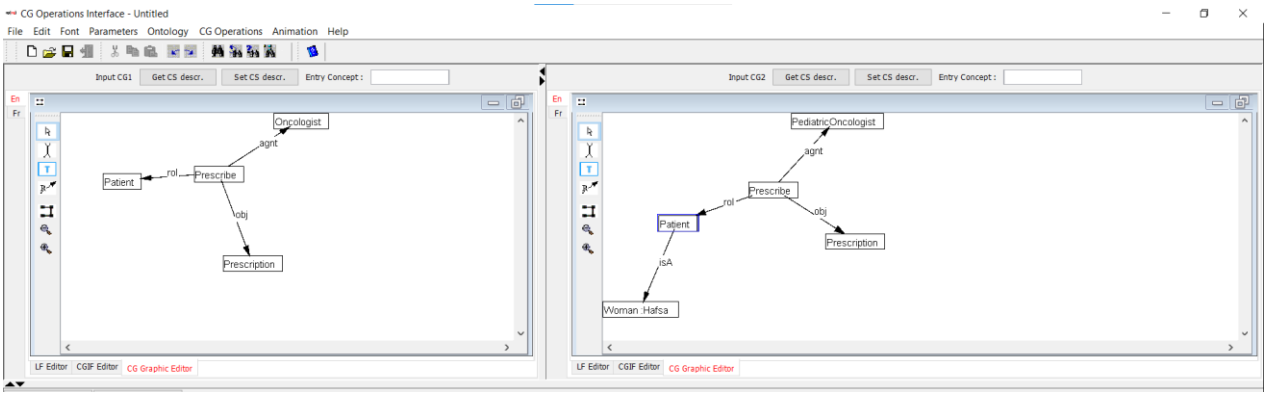
Send :"2"
Facility : DoctorOffice
agnt
Nurse :"1"
chrc
Attribute :Caring

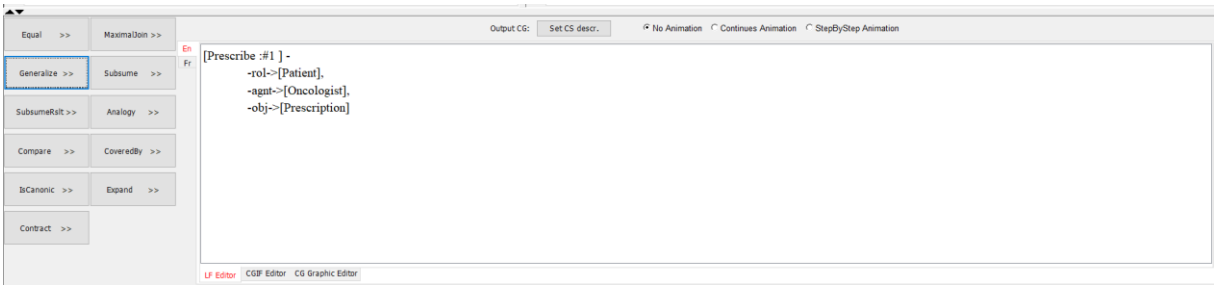
# Opérations sur les graphs conceptuels

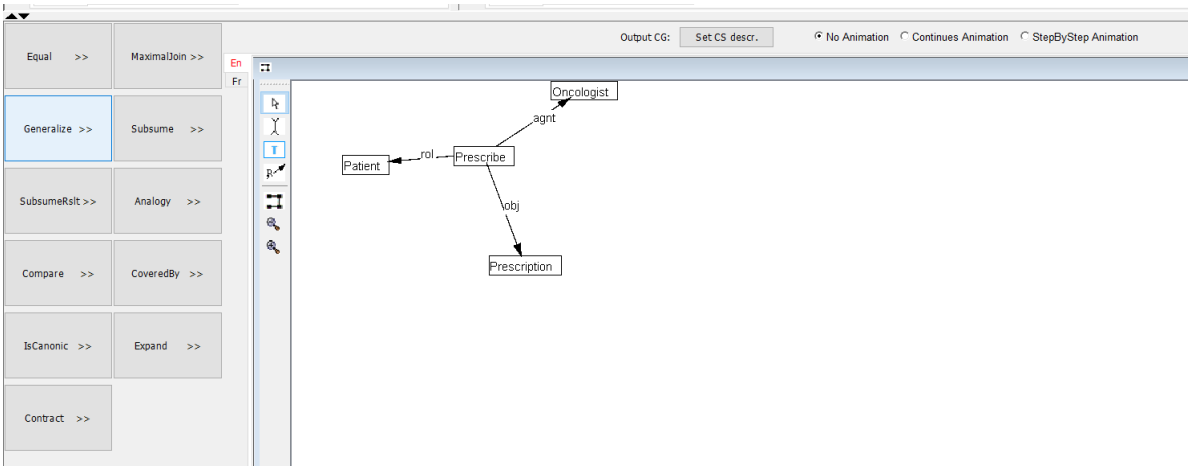
## Example 1:



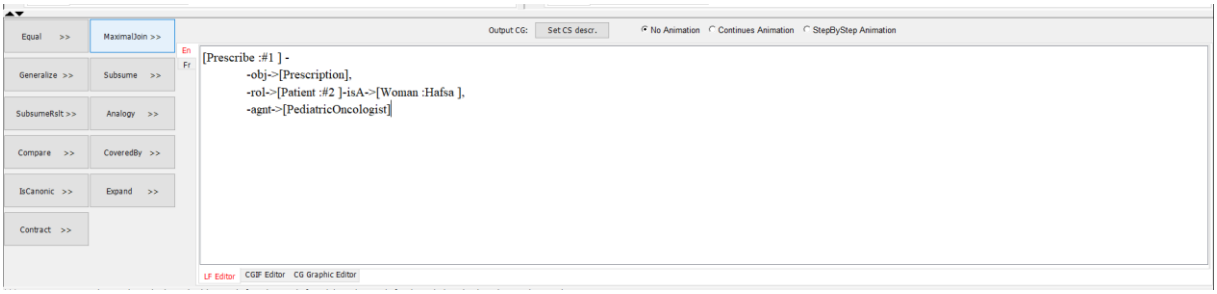



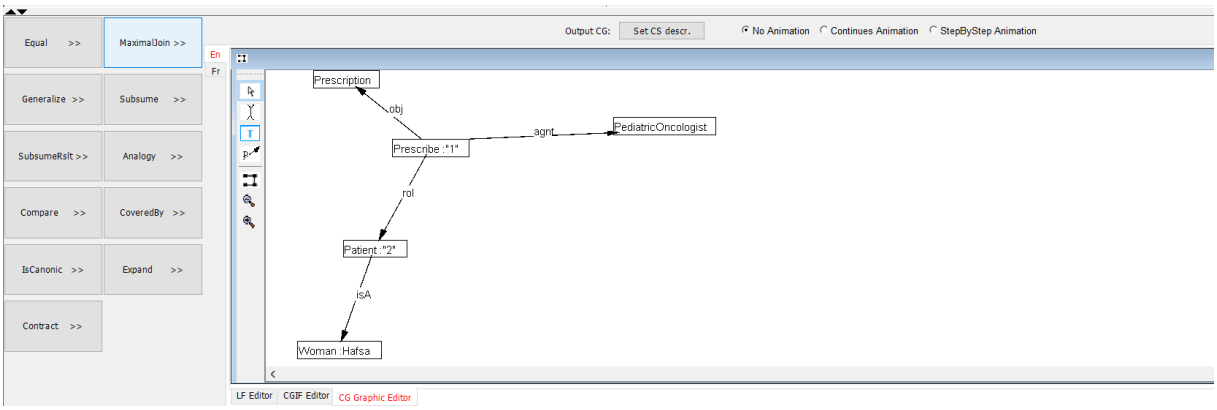

## 1 . Généralisation



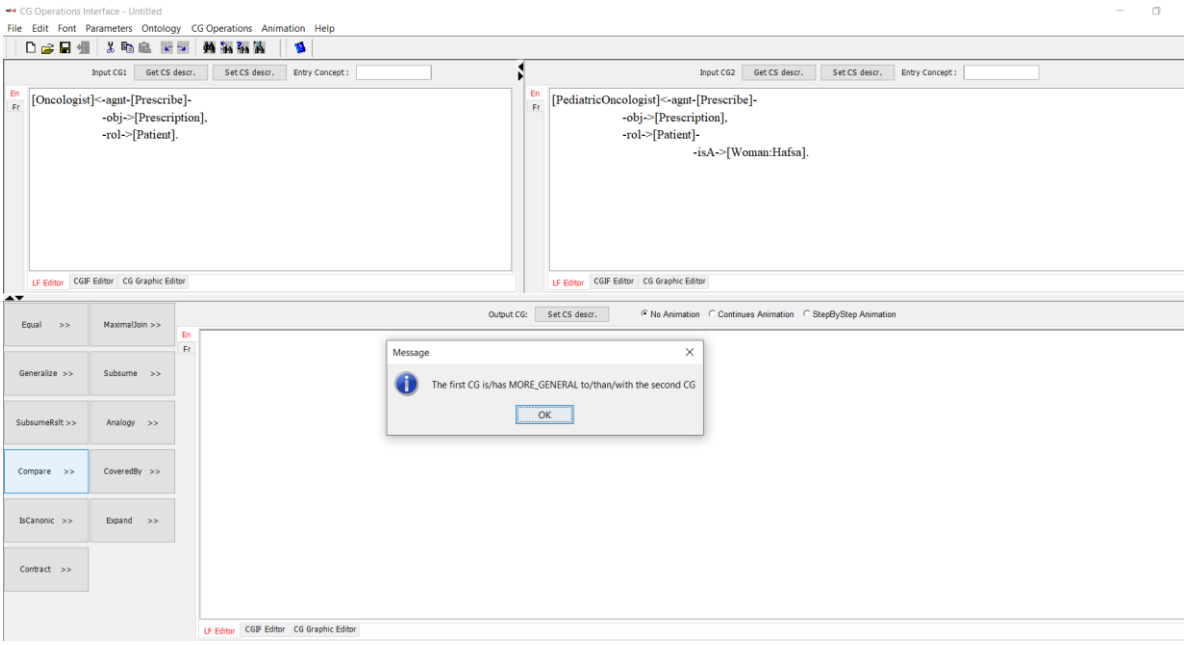



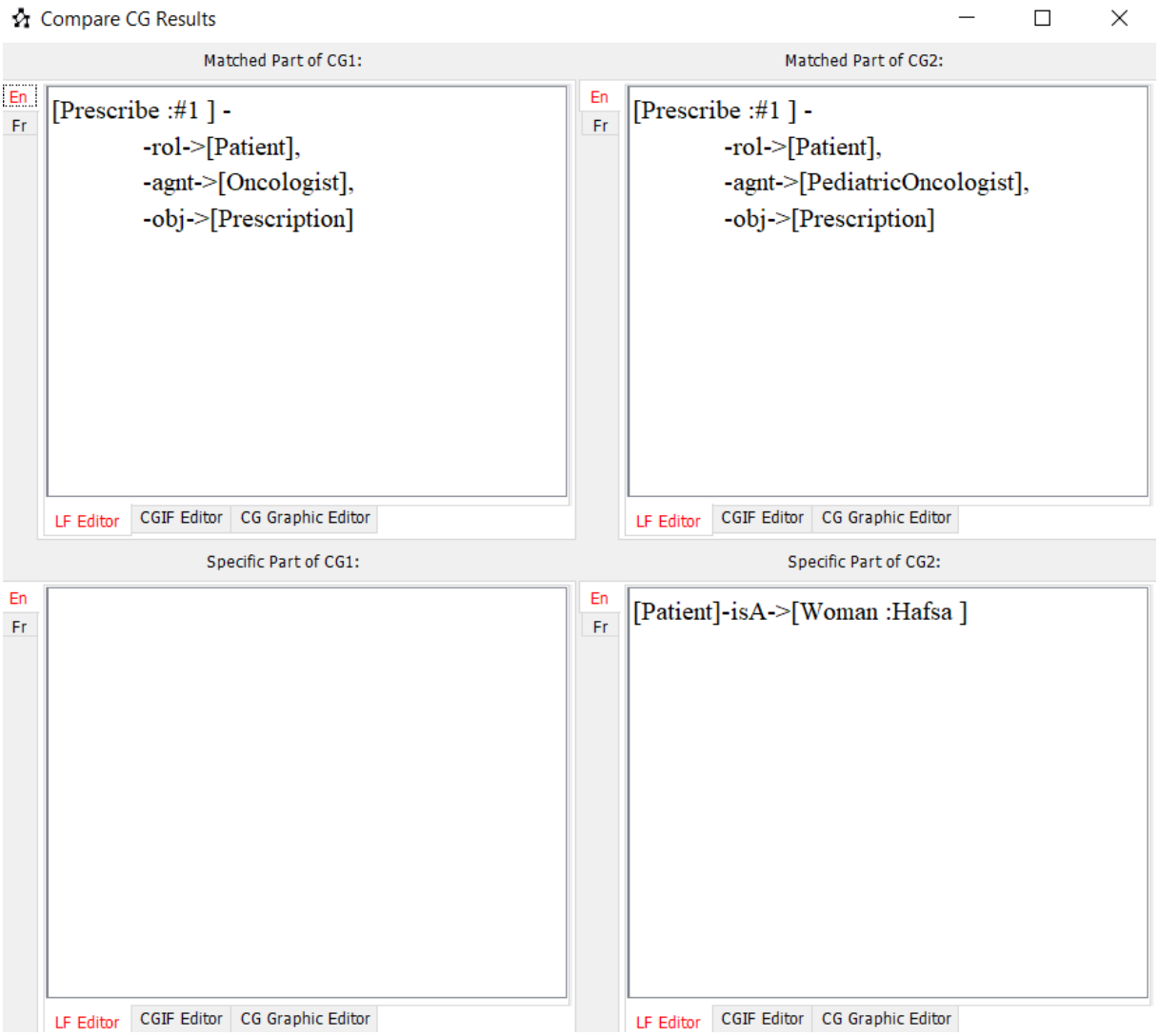
## 2. Jointure



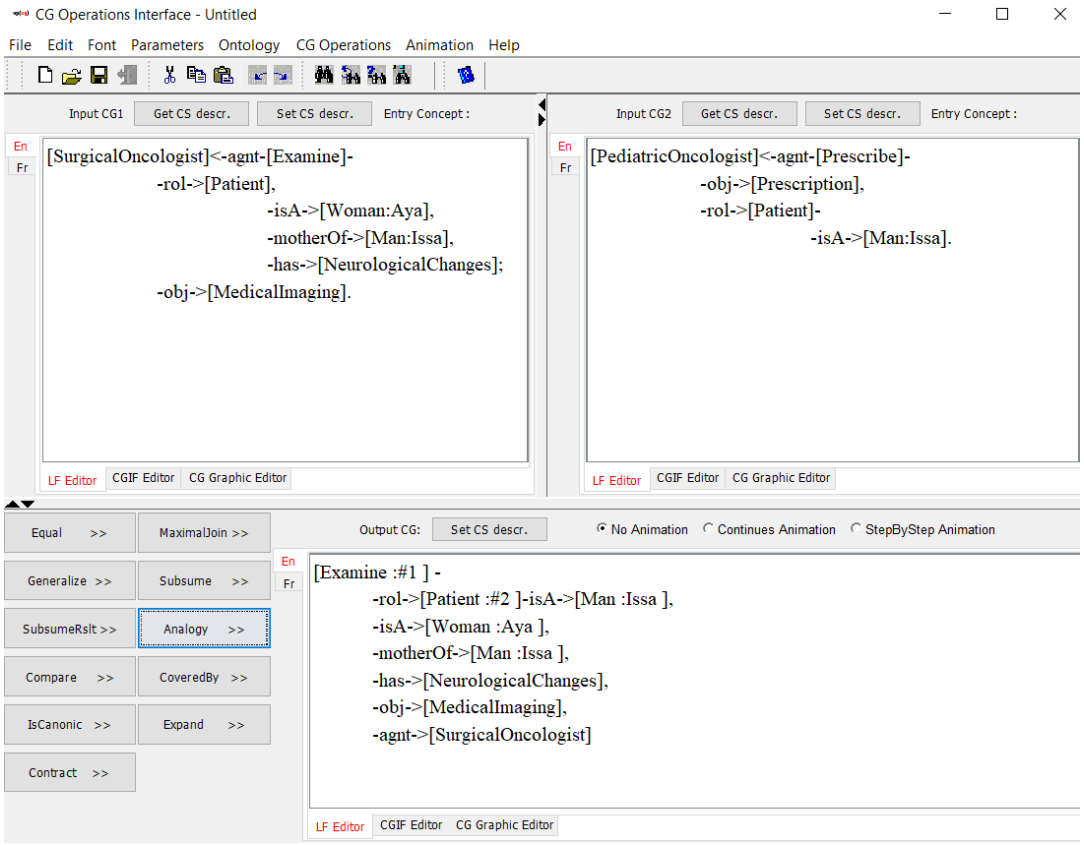

## 3. Comparaison



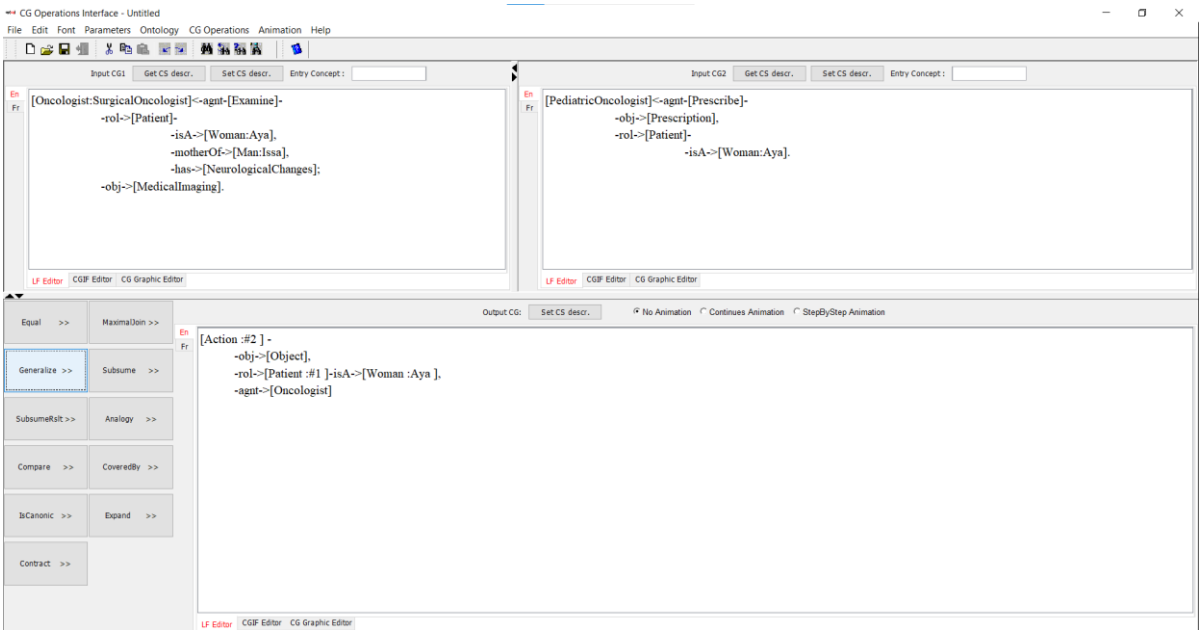

Compare CG Results
Matched Part of CG1:
En
Fr
[Prescribe :#1 ] -
-rol->[Patient],
-agnt->[Oncologist],
-obj->[Prescription]
LF Editor
CGIF Editor
CG Graphic Editor
Matched Part of CG2:
En
Fr
[Prescribe :#1 ] -
-rol->[Patient],
-agnt->[PediatricOncologist],
-obj->[Prescription]
LF Editor
CGIF Editor
CG Graphic Editor
Specific Part of CG1:
En
Fr
LF Editor
CGIF Editor
CG Graphic Editor
Specific Part of CG2:
En
Fr
[Patient]-isA->[Woman :Hafsa ]
LF Editor
CGIF Editor
CG Graphic Editor

## Example2:

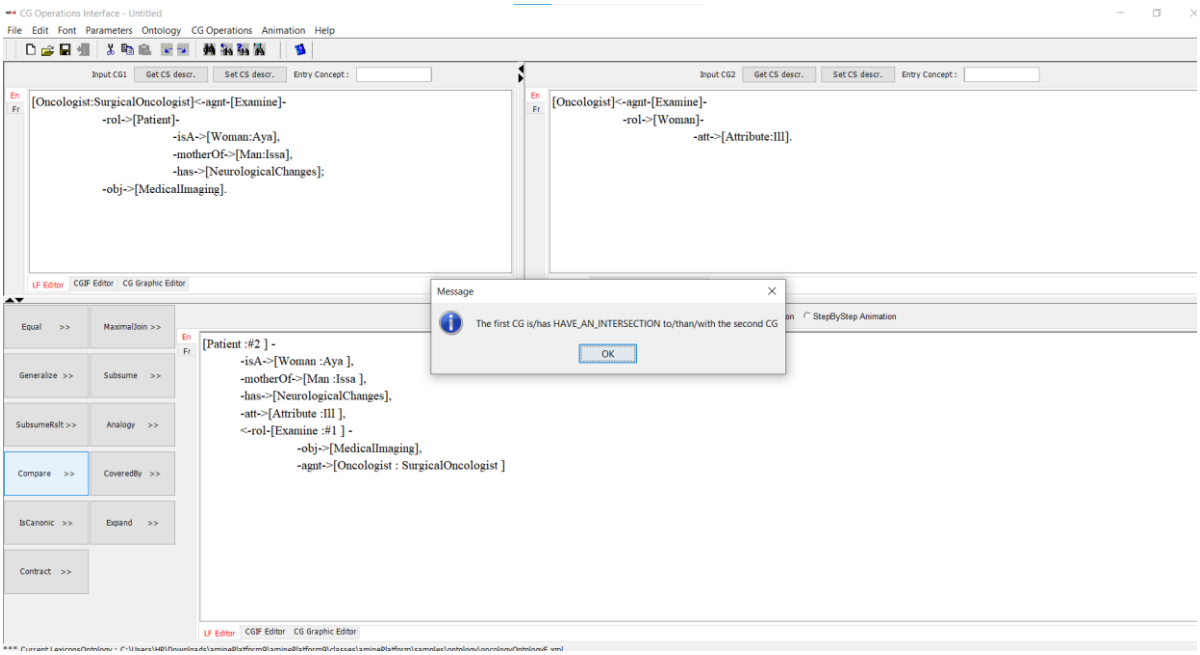
### 1. Analogie

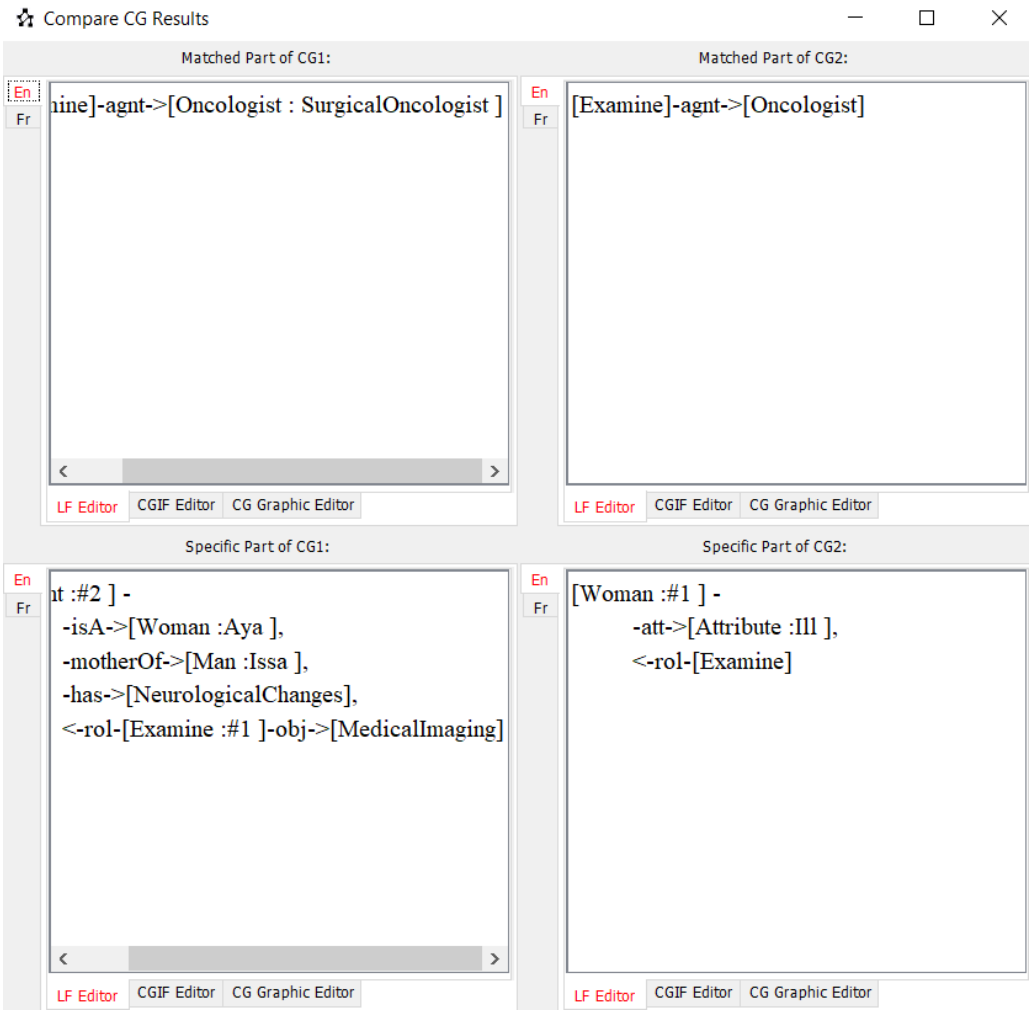



## 2.Généralisation

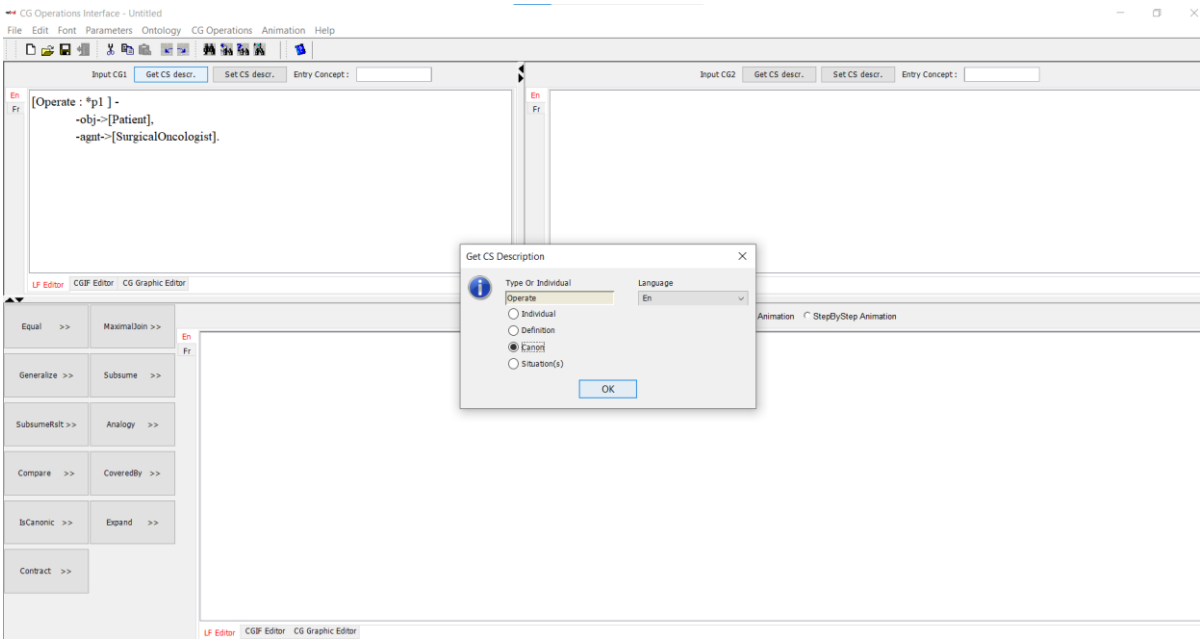


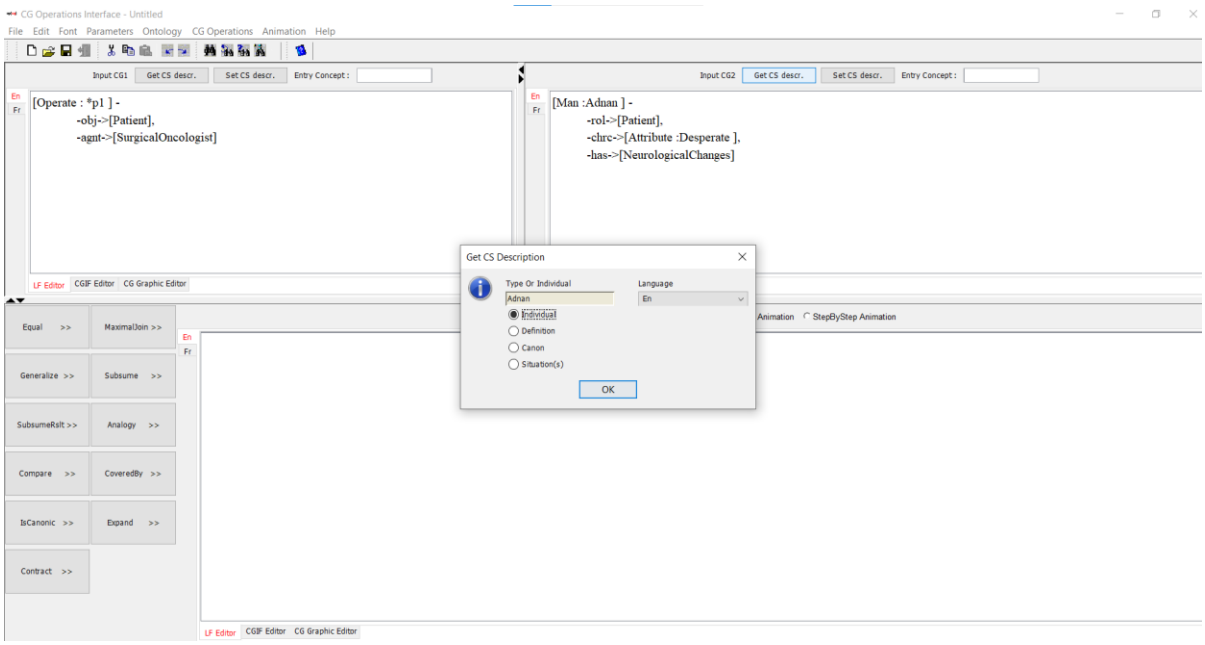
## 3.Comparaison

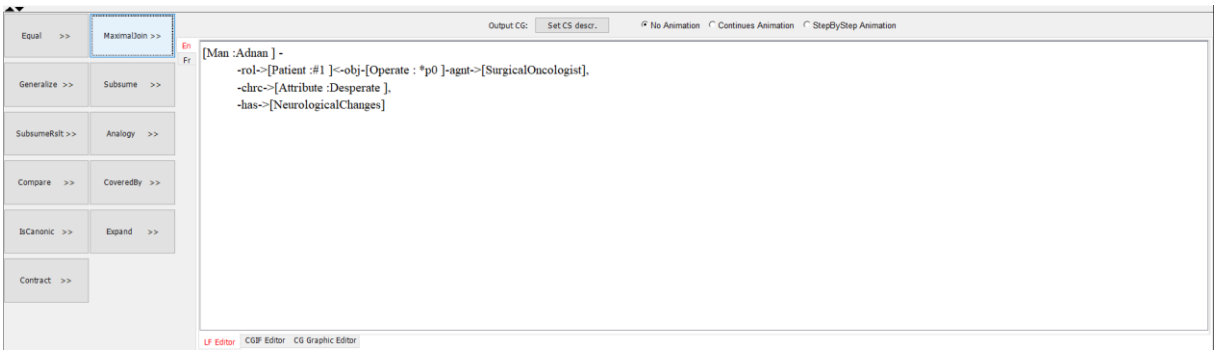


## Example 3 :


CG Operations Interface - Untitled
File Edit Font Parameters Ontology CG Operations Animation Help
Input CG1 Get CS descr. Set CS descr. Entry Concept :
Input CG2 Get CS descr. Set CS descr. Entry Concept :
[Operate : *p1 ] -
-obj->[Patient],
-agnt->[SurgicalOncologist].
Get CS Description
Type Or Individual
Operate
Language
En
Individual
Definition
Canon
Situation(s)
OK
Animation StepByStep Animation
Equal >>
MaximalJoin >>
Generalize >>
Subsume >>
SubsumeRslt >>
Analogy >>
Compare >>
CoveredBy >>
IsCanonic >>
Expand >>
Contract >>
LF Editor CGIF Editor CG Graphic Editor

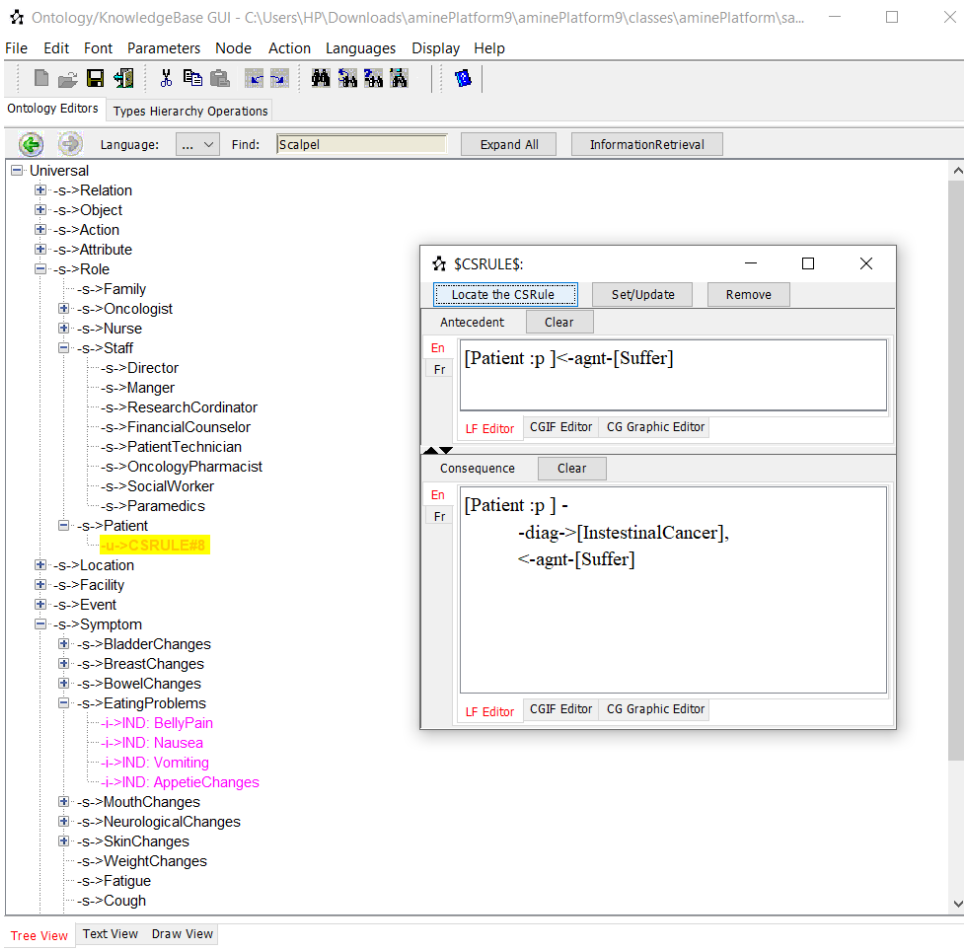

CG Operations Interface - Untitled
File Edit Font Parameters Ontology CG Operations Animation Help
Input CG1 Get CS descr. Set CS descr. Entry Concept :
Input CG2 Get CS descr. Set CS descr. Entry Concept :
[Operate : *p1 ] -
-obj->[Patient],
-agnt->[SurgicalOncologist]
[Man :Adnan ] -
-rol->[Patient],
-chrc->[Attribute :Desperate ],
-has->[NeurologicalChanges]
Get CS Description
Type Or Individual
Adnan
Language
En
Individual
Definition
Canon
Situation(s)
OK
Animation StepByStep Animation
Equal >>
MaximalJoin >>
Generalize >>
Subsume >>
SubsumeRslt >>
Analogy >>
Compare >>
CoveredBy >>
IsCanonic >>
Expand >>
Contract >>
LF Editor CGIF Editor CG Graphic Editor


Output CG: Set CS descr.
No Animation Continues Animation StepByStep Animation
Equal >>
MaximalJoin >>
Generalize >>
Subsume >>
SubsumeRslt >>
Analogy >>
Compare >>
CoveredBy >>
IsCanonic >>
Expand >>
Contract >>
[Man :Adnan ] -
-rol->[Patient :#1 ]<-obj-[Operate : *p0 ]-agnt->[SurgicalOncologist],
-chrc->[Attribute :Desperate ],
-has->[NeurologicalChanges]
LF Editor CGIF Editor CG Graphic Editor

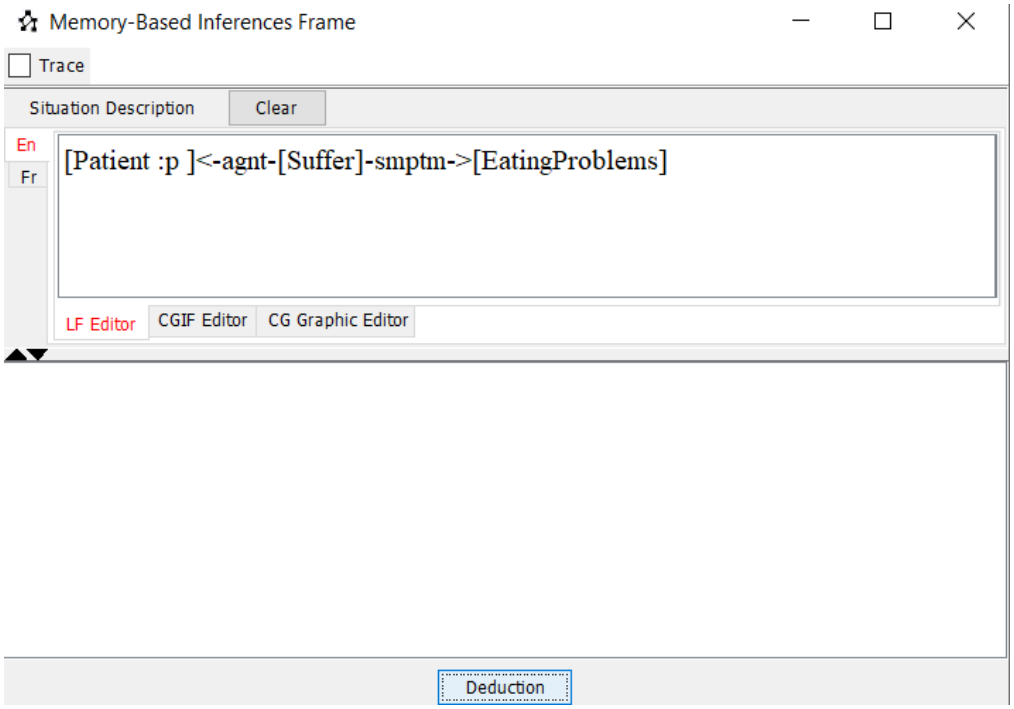
# Inférence basée sur la mémoire

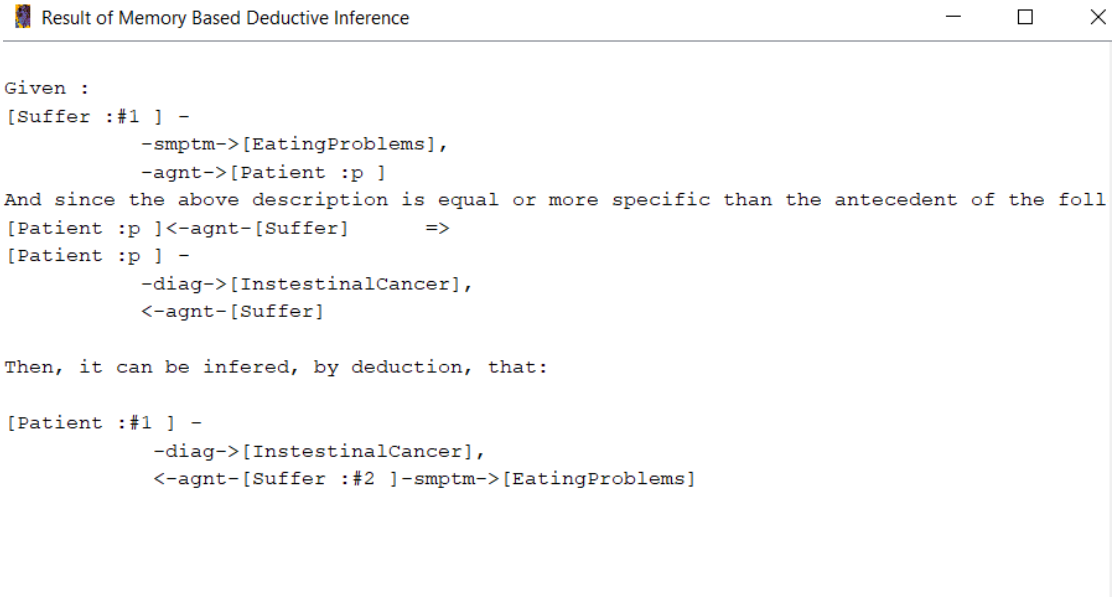
Dans l'approche classique, les faits et les règles à utiliser sont fournis au moteur d'inférence et il devrait chercher et identifier lui-même les faits et les règles à activer.

Dance cette partie on va tester la déduction, l'abduction et l'analogie.

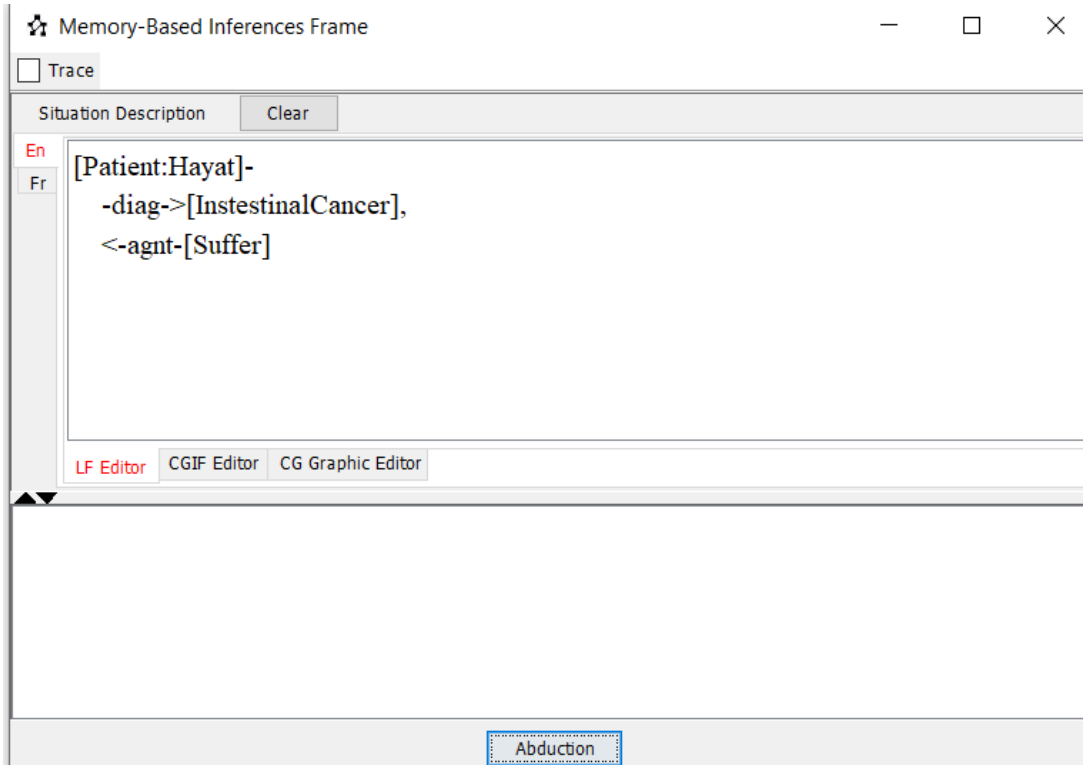


## 1.Déduction


Memory-Based Inferences Frame
Trace
Situation Description
Clear
En
Fr
[Patient :p ]<-agnt-[Suffer]-smptm->[EatingProblems]
LF Editor
CGIF Editor
CG Graphic Editor
Deduction


Result of Memory Based Deductive Inference
Given :
[Suffer :#1 ] -
-smptm->[EatingProblems],
-agnt->[Patient :p ]
And since the above description is equal or more specific than the antecedent of the foll
[Patient :p ]<-agnt-[Suffer] =>
[Patient :p ] -
-diag->[InstestinalCancer],
<-agnt-[Suffer]
Then, it can be infered, by deduction, that:
[Patient :#1 ] -
-diag->[InstestinalCancer],
<-agnt-[Suffer :#2 ]-smptm->[EatingProblems]

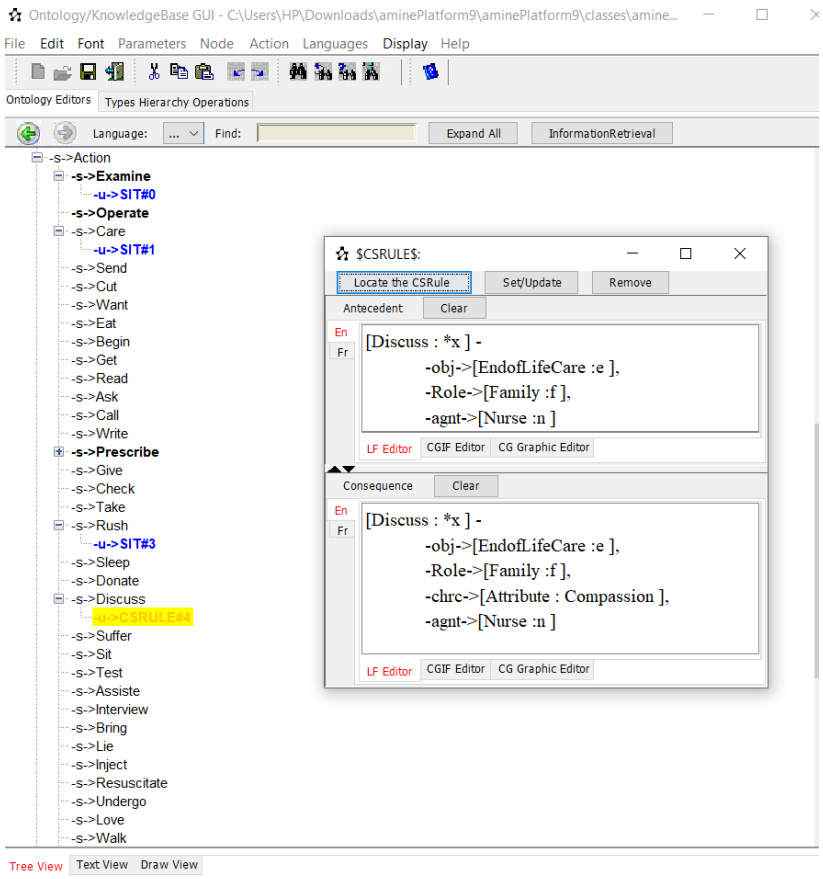
## 2.Abduction

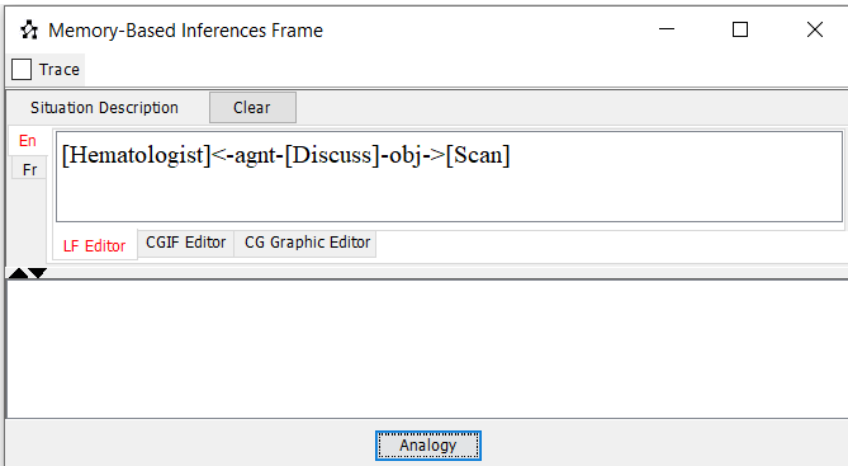


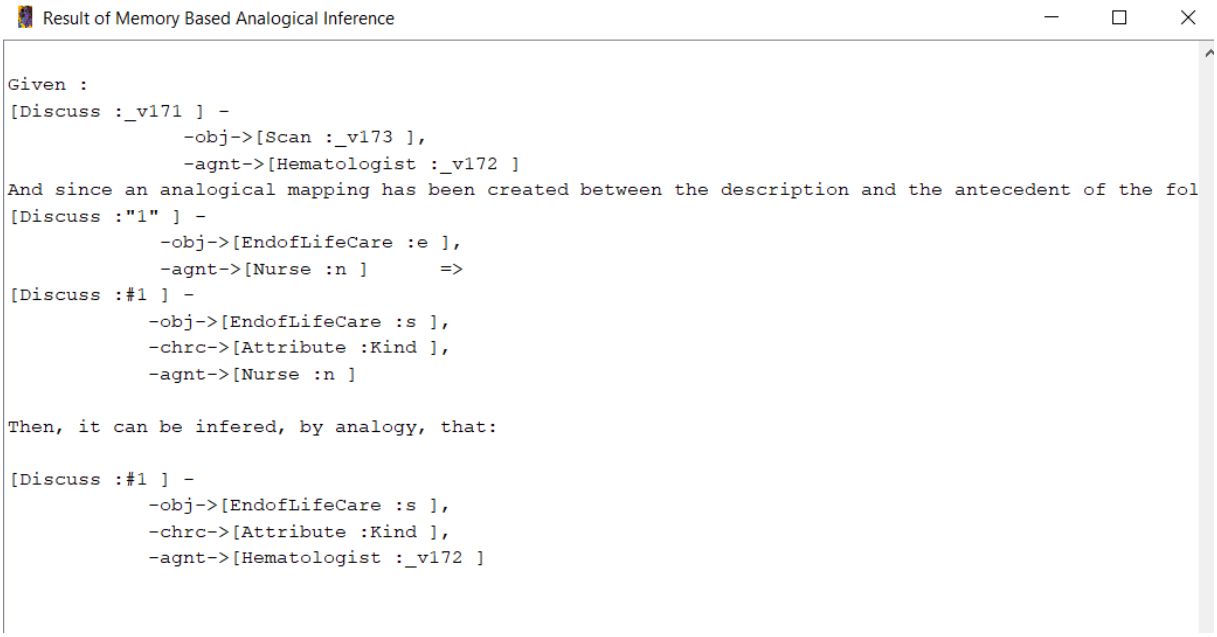

Result of Memory Based Abductive Inference

```
Given :
[Patient :#1  Hayat ] -
                  -diag->[InstestinalCancer],
                  <-agnt-[Suffer]
And since the above description is equal or more specific than the consequence of the following rule :
[Patient :p ]<-agnt-[Suffer]      =>
[Patient :p ] -
           -diag->[InstestinalCancer],
           <-agnt-[Suffer]

Then, it can be infered, by abduction, that:

[Patient :#1  Hayat ] -
                  -diag->[InstestinalCancer],
                  <-agnt-[Suffer]
```

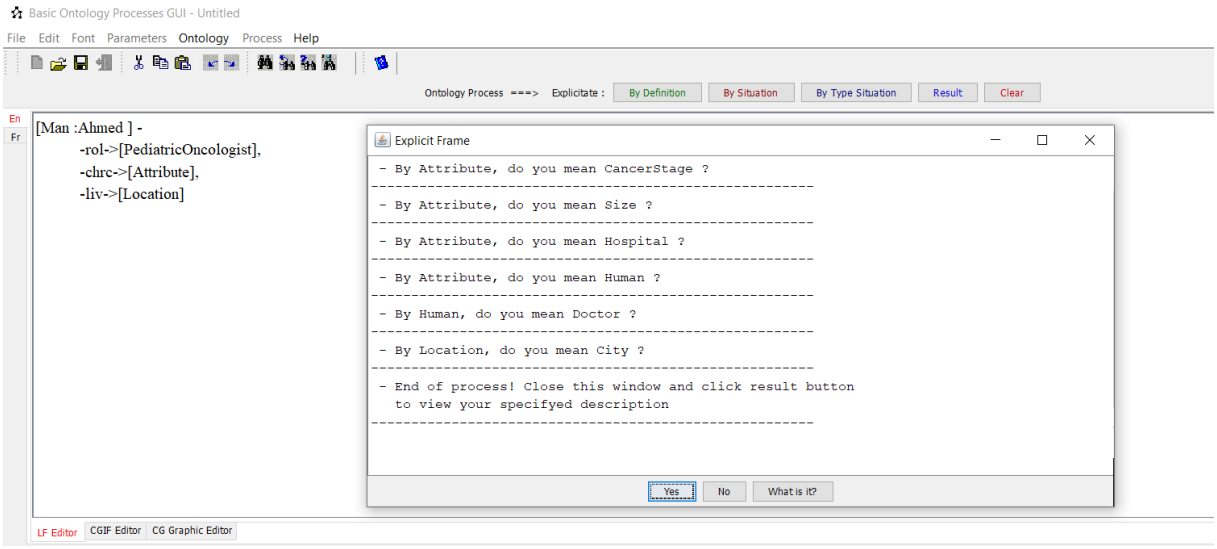
## 3.Analogie


Ontology/KnowledgeBase GUI - C:\Users\HP\Downloads\aminePlatform9\aminePlatform9\classes\amine...
File Edit Font Parameters Node Action Languages Display Help
Ontology Editors
Types Hierarchy Operations
Language:
Find:
Expand All
InformationRetrieval
-s->Action
-s->Examine
-u->SIT#0
-s->Operate
-s->Care
-u->SIT#1
-s->Send
-s->Cut
-s->Want
-s->Eat
-s->Begin
-s->Get
-s->Read
-s->Ask
-s->Call
-s->Write
-s->Prescribe
-s->Give
-s->Check
-s->Take
-s->Rush
-u->SIT#3
-s->Sleep
-s->Donate
-s->Discuss
-u->CSRULE#4
-s->Suffer
-s->Sit
-s->Test
-s->Assiste
-s->Interview
-s->Bring
-s->Lie
-s->Inject
-s->Resuscitate
-s->Undergo
-s->Love
-s->Walk
Tree View
Text View
Draw View
$CSRULE$:
Locate the CSRule
Set/Update
Remove
Antecedent
Clear
En
Fr
[Discuss : *x ] -
-obj->[EndofLifeCare :e ],
-Role->[Family :f ],
-agnt->[Nurse :n ]
LF Editor
CGIF Editor
CG Graphic Editor
Consequence
Clear
[Discuss : *x ] -
-obj->[EndofLifeCare :e ],
-Role->[Family :f ],
-chrc->[Attribute : Compassion ],
-agnt->[Nurse :n ]
LF Editor
CGIF Editor
CG Graphic Editor

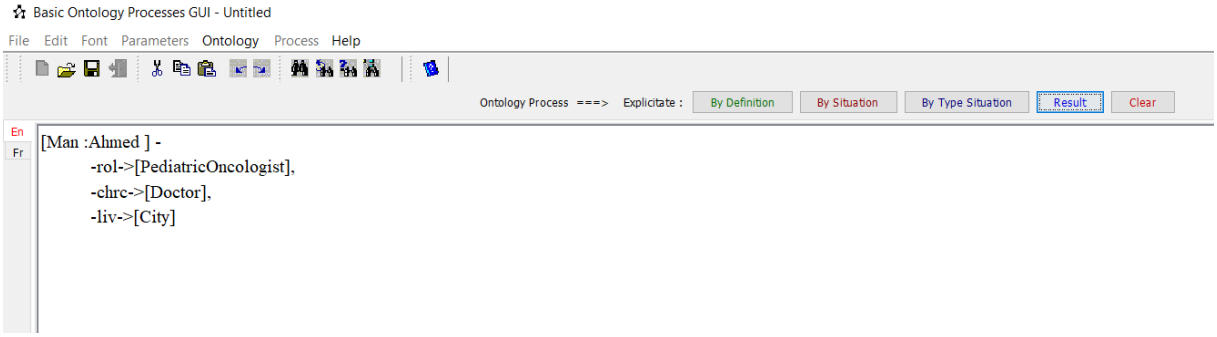

Memory-Based Inferences Frame
Trace
Situation Description
Clear
En
Fr
[Hematologist]<-agnt-[Discuss]-obj->[Scan]
LF Editor
CGIF Editor
CG Graphic Editor
Analogy


Result of Memory Based Analogical Inference
Given :
[Discuss :_v171 ] -
-obj->[Scan :_v173 ],
-agnt->[Hematologist :_v172 ]
And since an analogical mapping has been created between the description and the antecedent of the fol
[Discuss :"1" ] -
-obj->[EndofLifeCare :e ],
-agnt->[Nurse :n ] =>
[Discuss :#1 ] -
-obj->[EndofLifeCare :s ],
-chrc->[Attribute :Kind ],
-agnt->[Nurse :n ]
Then, it can be infered, by analogy, that:
[Discuss :#1 ] -
-obj->[EndofLifeCare :s ],
-chrc->[Attribute :Kind ],
-agnt->[Hematologist :_v172 ]

# Processus




## Résultat



# Conclusion

Ce rapport discute et met en évidence les problèmes et la méthodologie de conception et de développement d'une ontologie et illustre l'utilisation de la plateforme Amine et de la hiérarchie des classes et sous-classes.

Différents concepts et ses membres de l'ontologie d'oncologie sont construits, et sont également expliquées à l'aide d'une capture d'écran. Avec l'implémentation de définitions, canons, descriptions, règles et situations, en utilisant les différents outils présentés par la plateforme, incluant : Ontology/KB Editor, CGEditor, CGOperations, MemoryBaseInferences, et BasicOntologyKBProcess.

Cela peut être utile pour les chercheurs qui souhaitent commencer avec la conception et le développement d'une ontologie et ses aspects connexes.

À l'avenir, il pourra être étendu au déploiement, à l'évaluation et à d'autres problèmes d'ontologie. L'ontologie est en cours d'extension pour couvrir différents types de cancers, avec leurs spécifique définitions, symptômes, diagnostics et traitements possibles.