TOPOLOGOS

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Team:

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- David Gurtner, ID – Java, Web Services

Squeak technical assistance:

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- Alexandre Bergel, IAM

Objectives

- Presentation of *Topologos*, software written in Squeak and developed this year.
  - Allows the modelling of processes and objects together.

  Merging object modelling and process modelling solves many problems of inheritance of attributes.

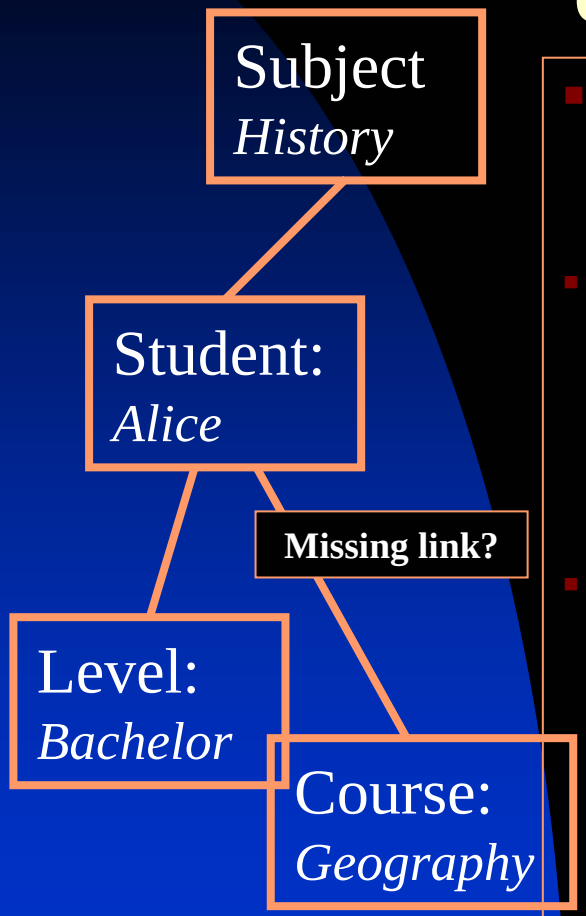
Plan of the presentation

- Issue of transparency of data and processes
- Problem of the separation between data modelling and flow modelling
- Solution of merging processes and objects
- Squeak and Topologos software
- Conclusion

Transparency of Data and Processes

- In large companies or administration nobody knows any longer exactly what the processes and the available data are.
- Our objective at the university of Berne is the definition and monitoring, of processes and data, for the whole administrative systems.

Transparency of Data and Processes



- In large companies or administration nobody knows any longer exactly what the processes and the available data are.
- **Data modelling:**

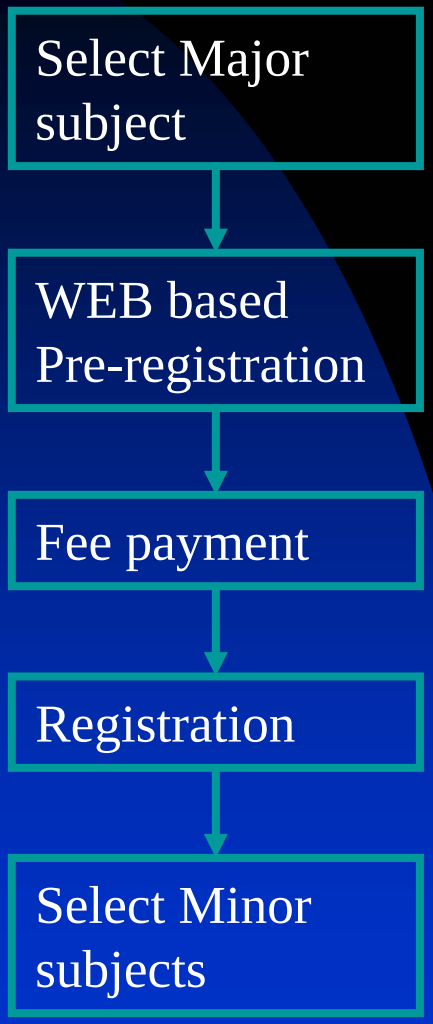
  What are the Entities and their relationship (Class , ERD)?

  - Who are the students following a particular course?
  - Could I get a list of students attempting to the course in history (at Bachelor level?
- Process and workflow modelling:

  What are the procedures? Who is responsible for an activity? When should an activity starts, and stops? What are the data required? What are the data available or missing? What applications should we develop?

  - What is the procedure to register a student? Who is responsible for?
  - What is the procedure to generate or close an Email account?
  - What are the prerequisite for a student to attempt an exam?

Transparency of Data and Processes



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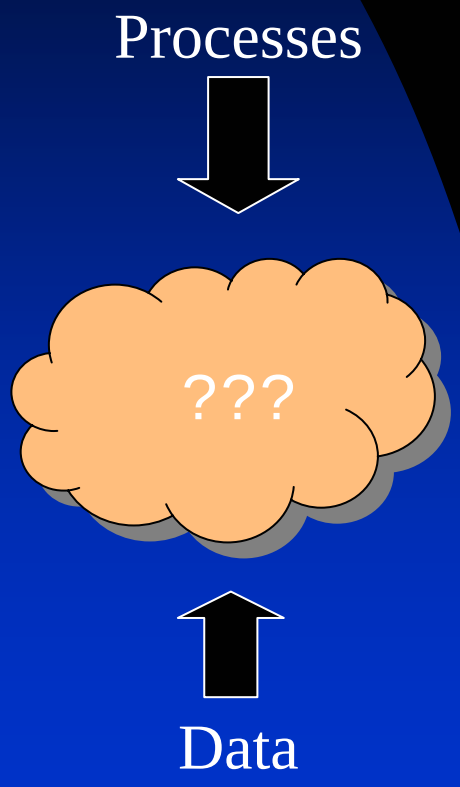
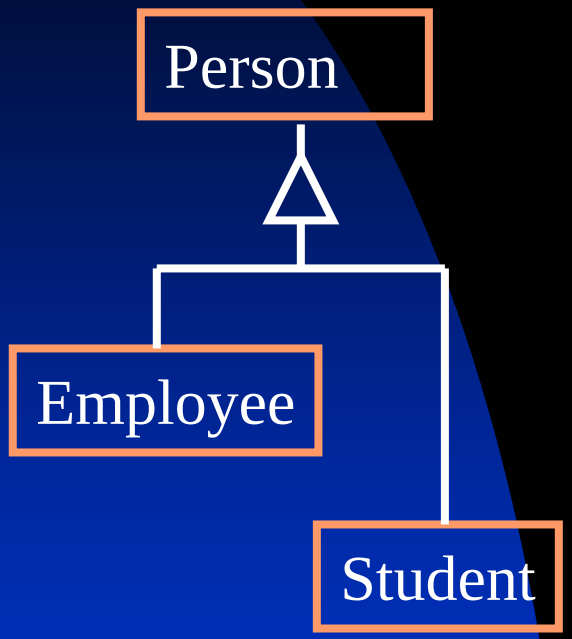
Main approaches in modelling techniques



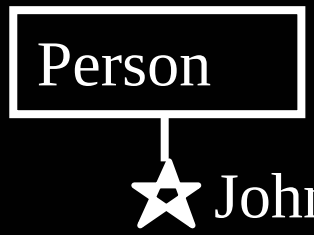
- Flow modelling (Top down):
  Data Flow Diagrams, Workflows, Process modelling (UML AD)
- Data modelling (Bottom up):
  Database ERD,OO techniques: class diagrams
- These techniques are totally separated, and the transparency of both processes and data cannot be guaranteed.

A philosophical question:

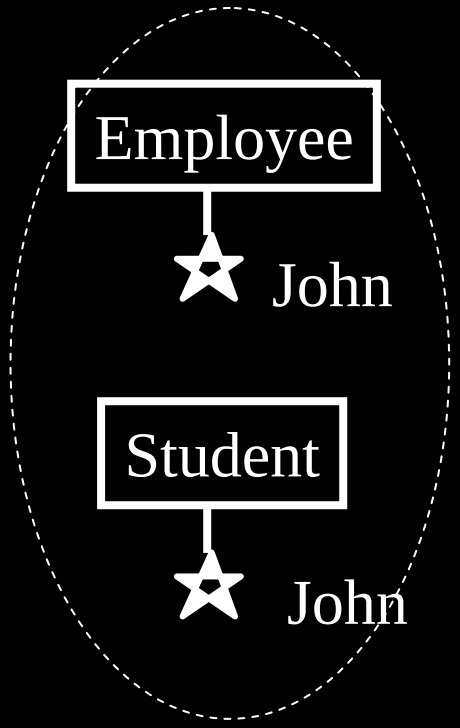
What is a student?



- Is Student a sub-class of Person?



Should we instantiate
One object Person?
An object Employee
and an object Student?



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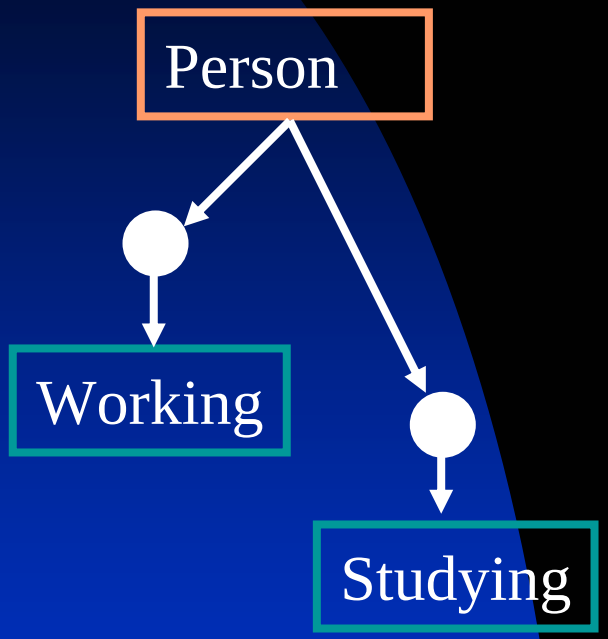


It is improper to say that a Student a sub-class of Person.

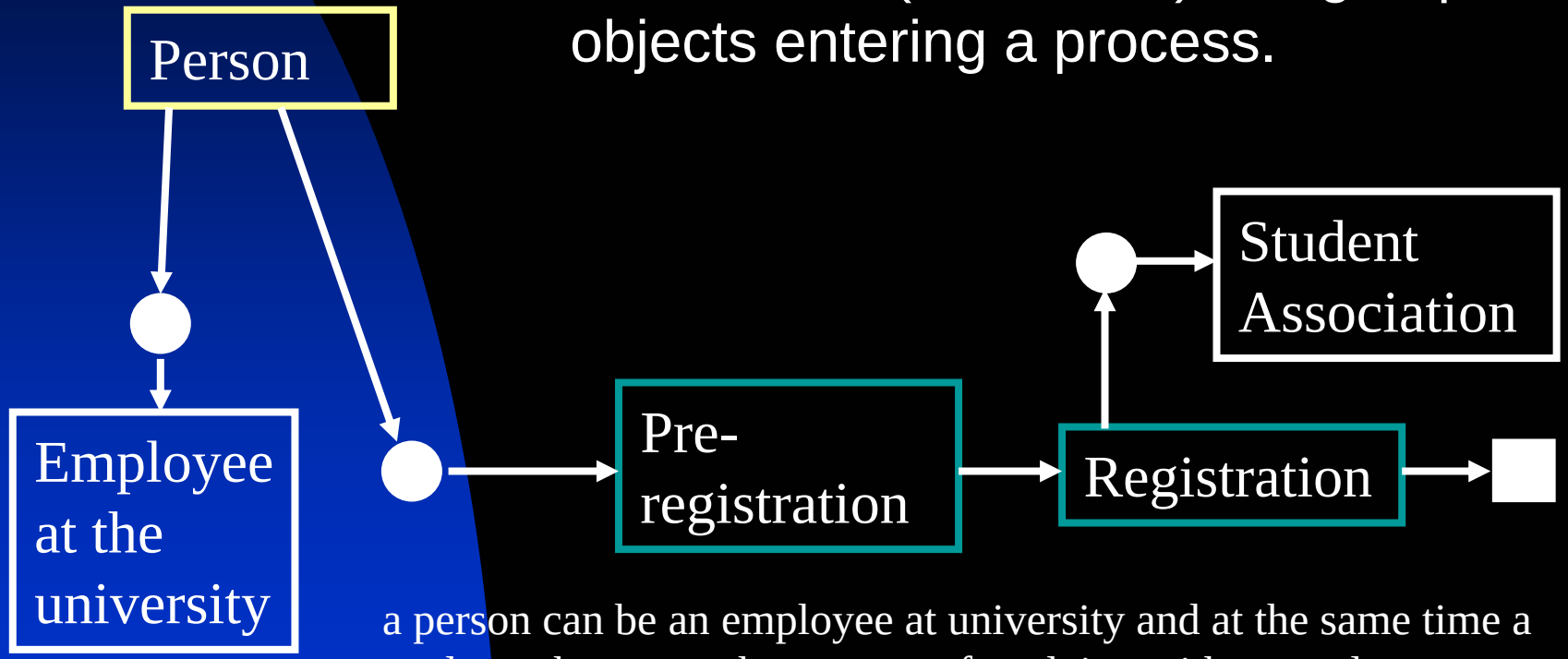
"A student is a person who entered the process of studying."

The importance of processes for the objects

- Objects
  - are created by processes.
  - participate and circulate within processes.
- Attributes
  - are resulting of the processes.
    - Example: If a frog has blue eyes, this is because its eye constitution had followed a process which leads to have blue eyes: the “Blue eye process”, It is just necessary then, to know what “color eye process” the frog followed in order to know the color of its eyes.
  - are necessary only because the processes are not known.
- Inheritances problems
  - occurs when an object participates to several processes.
  - disappear when class diagrams and process views (e.g. activity diagrams) are merged together.

Why we should merge objects and processes?

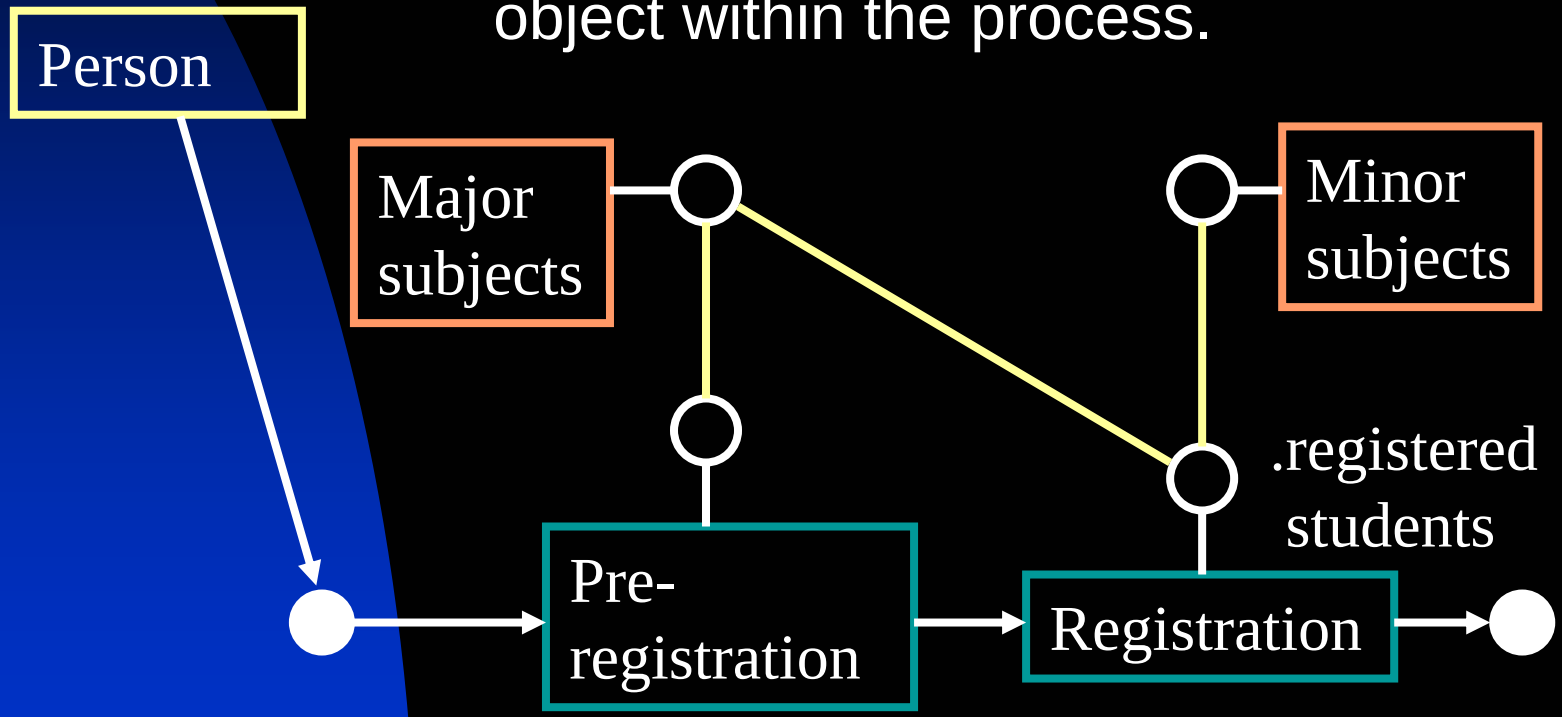
- A sub-class (or sub-set) is a group of objects entering a process.



a person can be an employee at university and at the same time a student who enters the process of studying with several stages: pre-registration, registration, etc.

Why we should merge objects and processes?

- Attributes depend on the location of the object within the process.

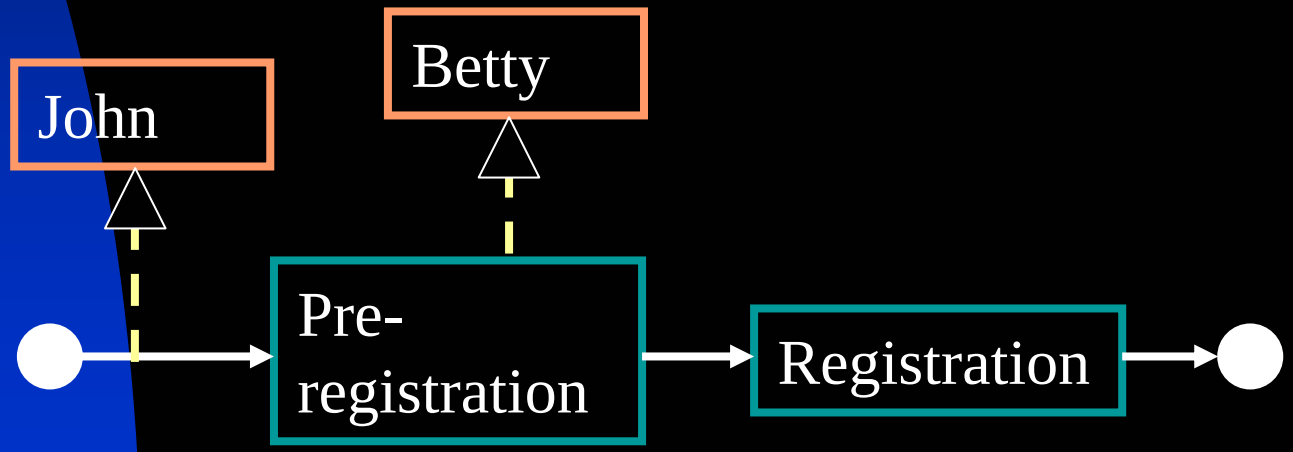


Why we should merge objects and processes?

- A pilot or responsible can be defined for each process or activity.

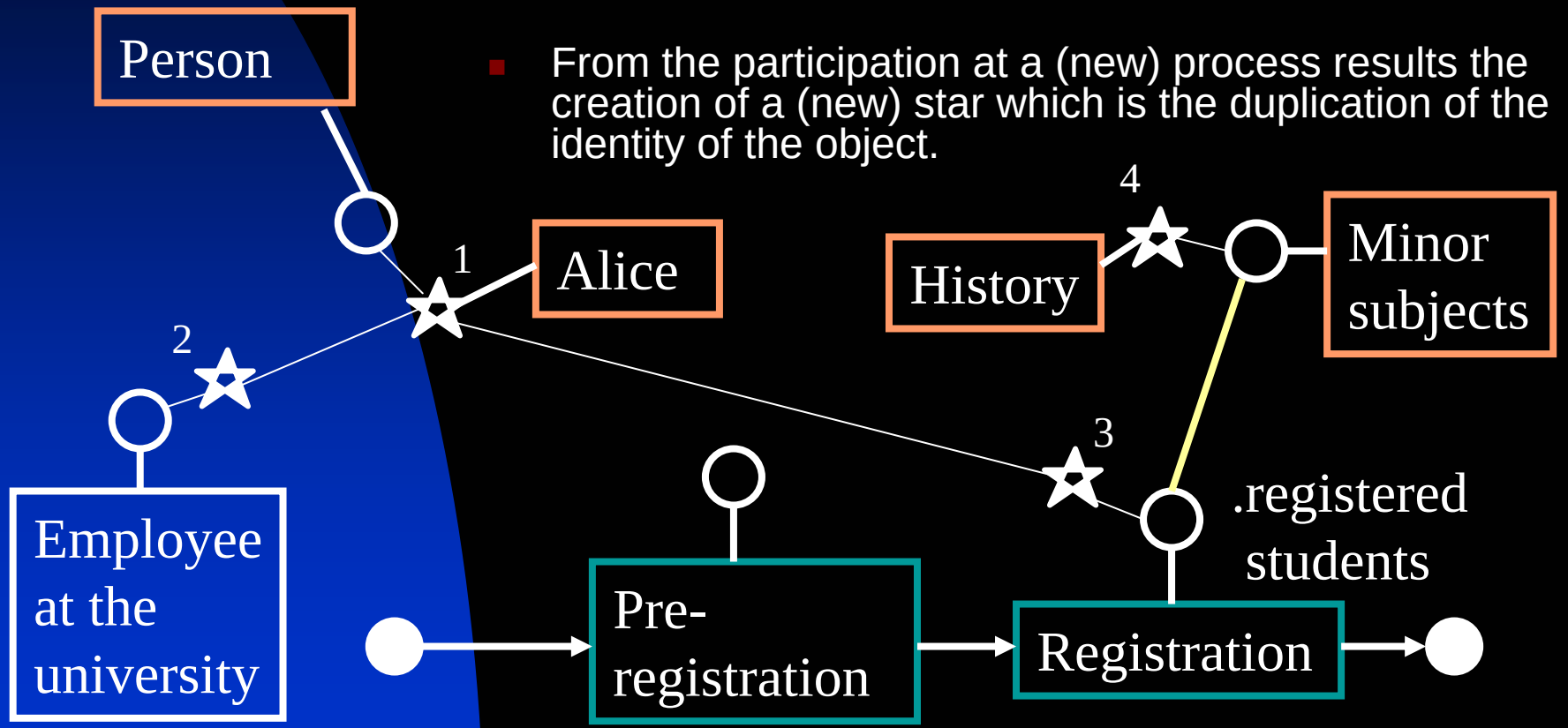
  With possible delegation of responsibility

  John is responsible for the whole process of registration, but the task of pre-registration is delegated to Betty.



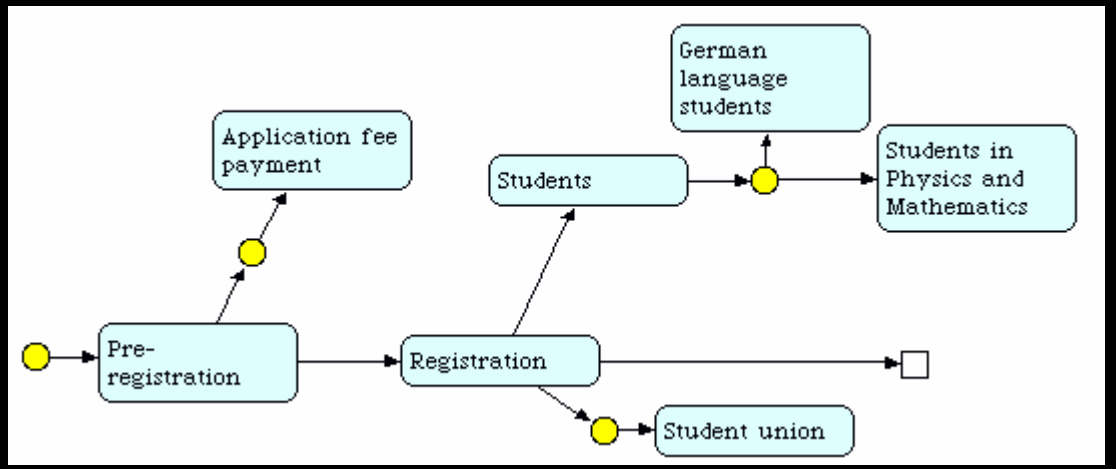
How to instantiate the objects?

- An instantiation consists in the creation of an object from a particular sub-set (or class).
- From the participation at a (new) process results the creation of a (new) star which is the duplication of the identity of the object.

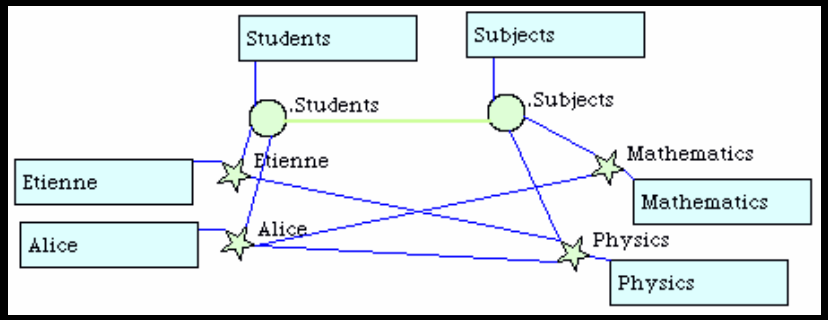


Software : Topologos

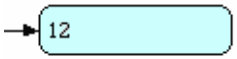
- For process modeling



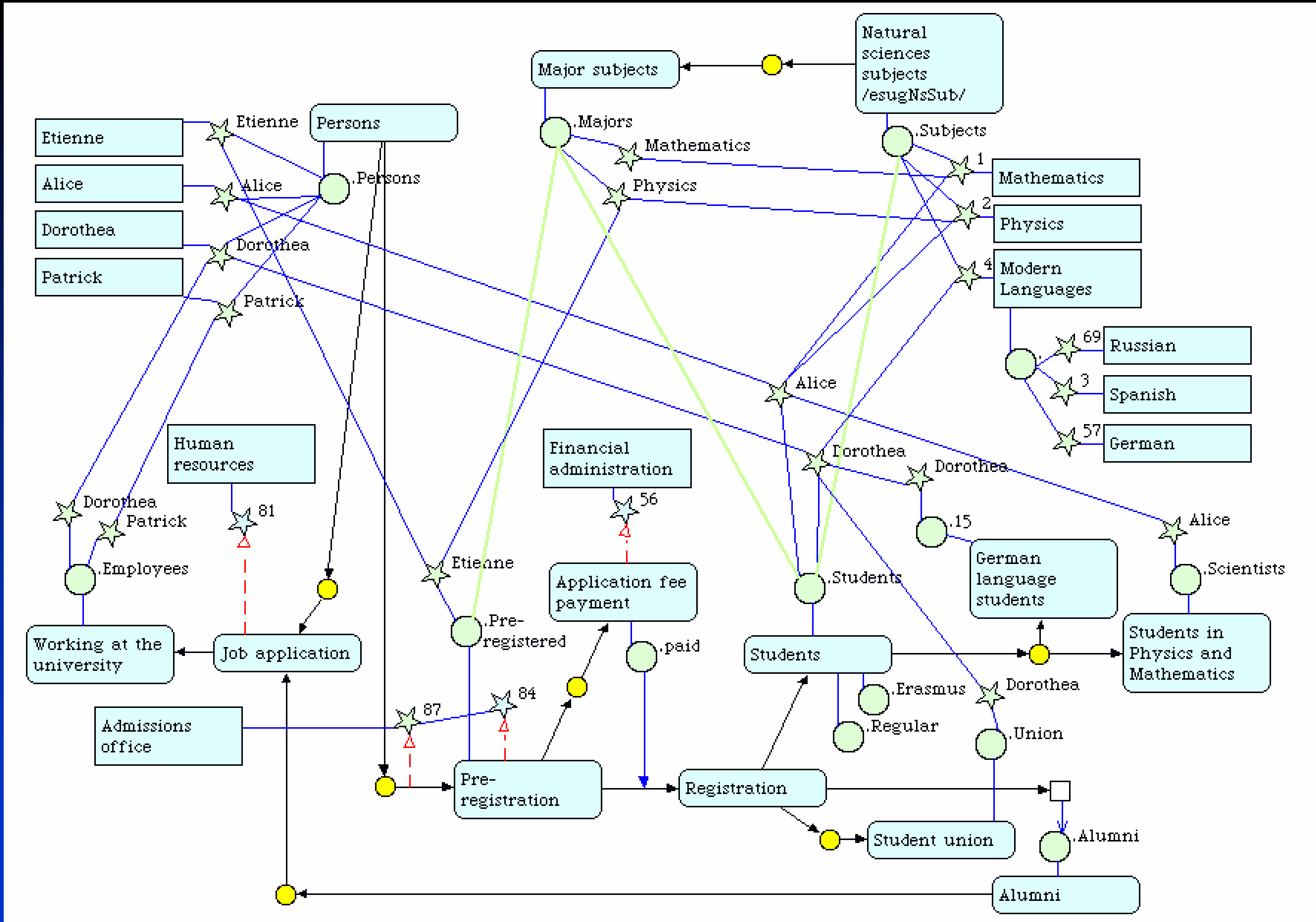
- And object modeling



Software Elements

	NODE	Entity Class or Object
	NODE	Activity Part of a process Process
	NODE DOT	Entity enters a process with duplication of identity
	NODE GATE	Gate of life Out coming of a process with lost of identity
	STAR	Identity
	STAR CIRCLE	Place Collection of objects Class
	ARC	Specify the process flow
	RELATION	Relationship between stars, Or between node and star.

A DOT is a NODE without name. A GATE is a particular DOT.
A CIRCLE is a STAR whose name begins with a . (point)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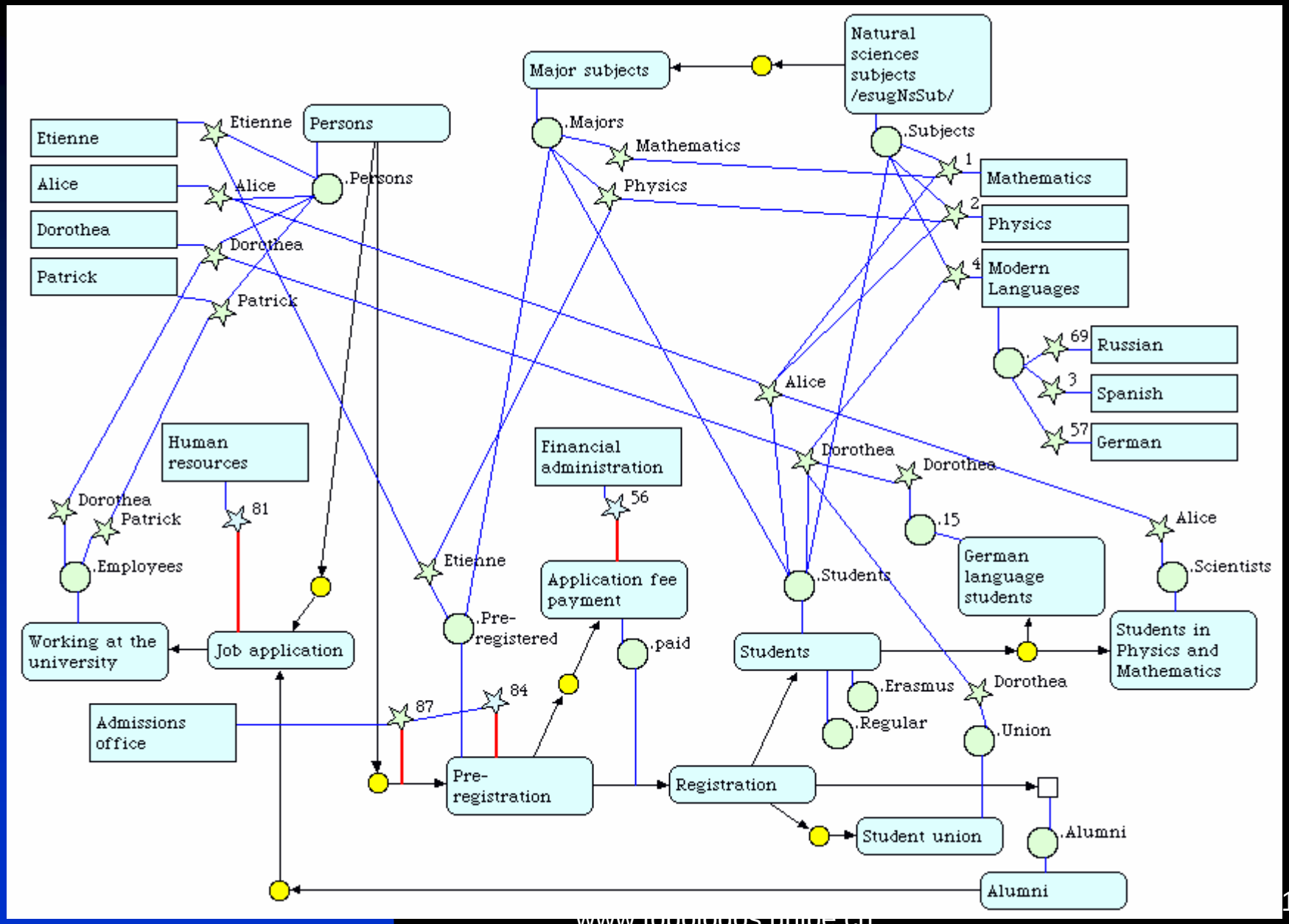
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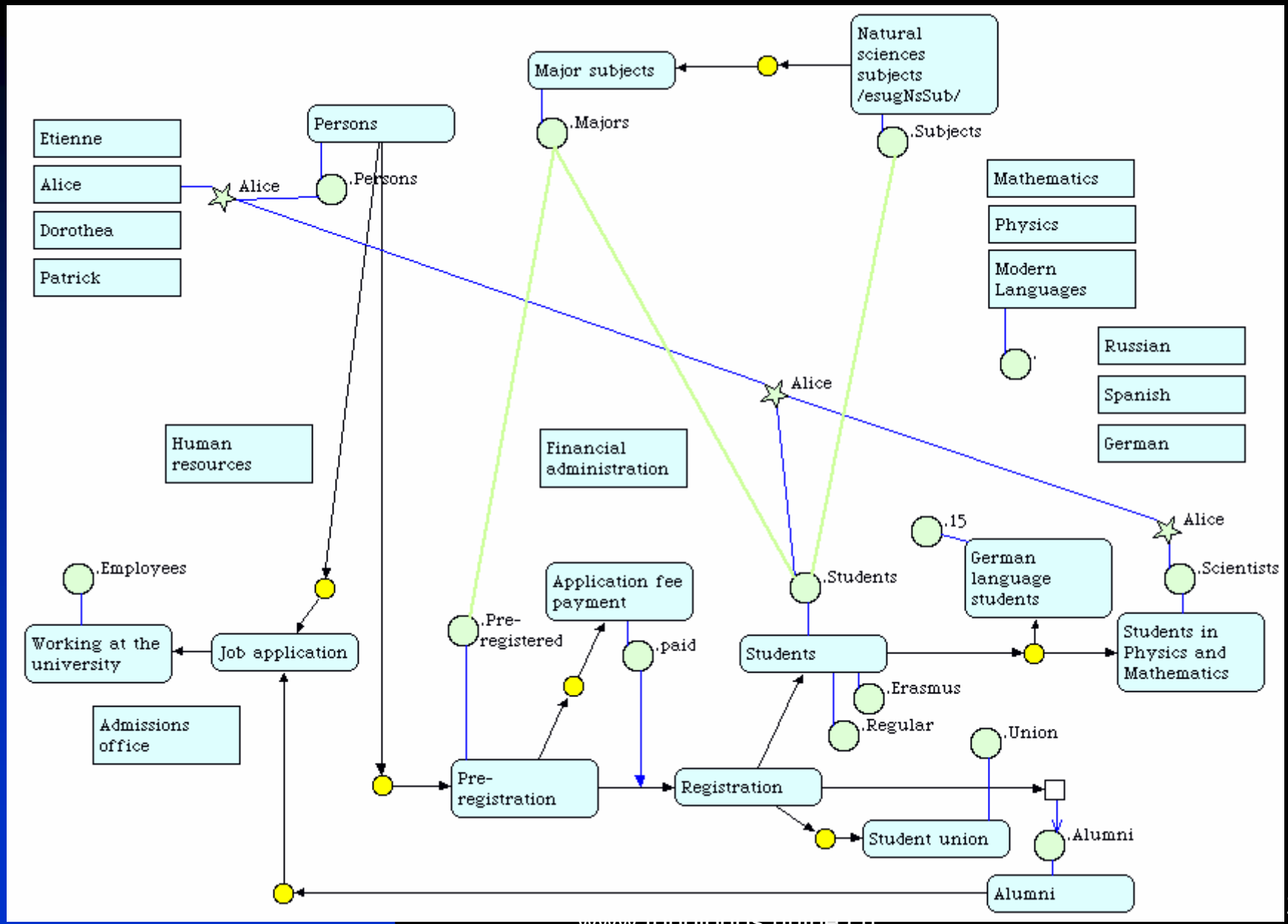
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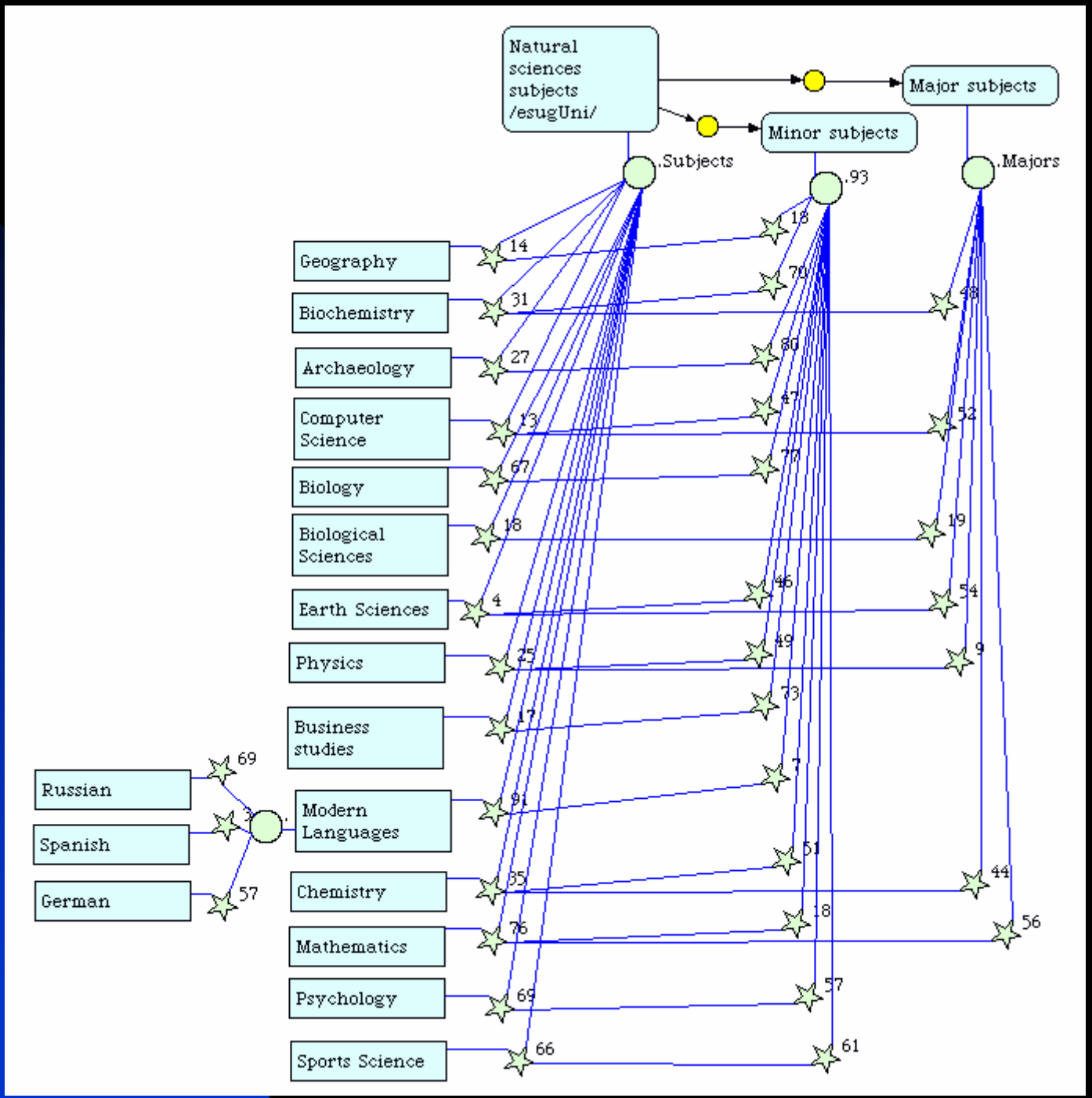
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Archaeology
Computer Science
Biology
Biological Sciences
Earth Sciences
Physics
Business studies
Modern Languages
Russian
Spanish
German
Chemistry
Mathematics
Psychology
Sports Science

Squeak contribution

Squeak is a perfect tool to precise and validate new concepts:

- Open source
- Free
- Allows fast prototyping and Xtreme programming
- Fully object oriented
- Powerful graphical user interface with ConnectorMorph

Future work

- Formalize the semantic of the elements NODE, CIRCLE, STAR, DOT, GATE etc.
- Simplify user interface
- Develop a simple Web interface with Seaside for process definition and monitoring
- Monitor real processes and data through Web Services / SOAP
- Develop an interface with a main IS Java Web Server

Conclusions

- Objects and processes must be tightly coupled in one modelling tool in order to obtain transparency of data and processes.
- The questions of the identity and the instantiation of objects ‘What is a student?’ lead to a new definition which allows integration of processes and objects within ‘Object Flow Diagrams’.
- The software supports the definition and monitoring of processes and data (classes and objects).

Next

- Please contact me if you have questions, or if you want a demonstration of the software
- Bring your support and contribution to this project :)
- For more information:
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  http://www.topologos.unibe.ch