

A UML Profile for MASIF Compliant Mobile Agent Platform

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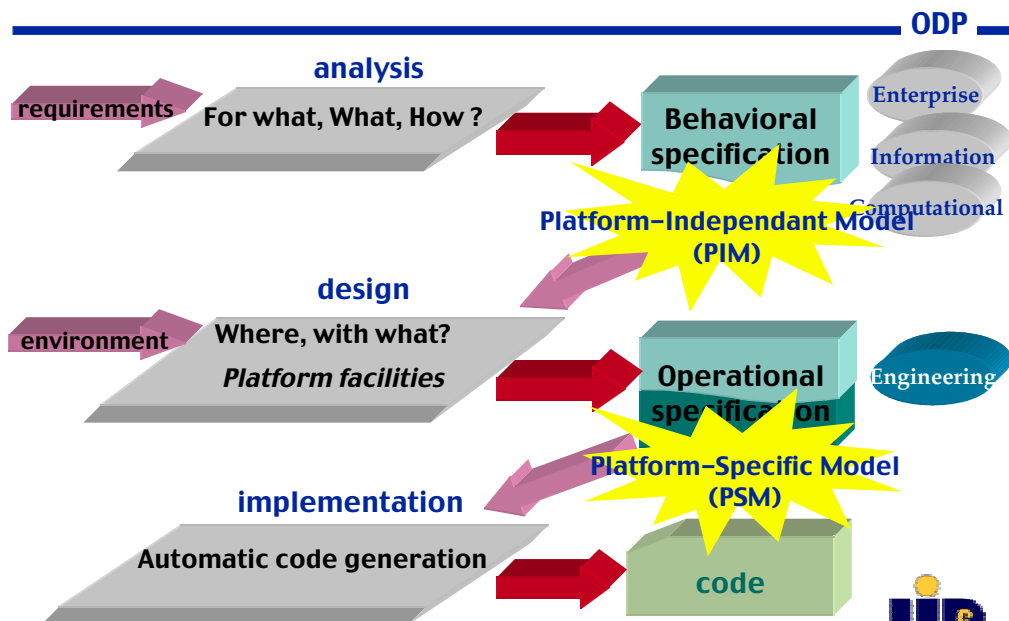
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S ystèmes
R épartis et
C oopératifs

ODAC Principles



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ODAC Methodology (Open Distributed Applications Construction)

Elaboration, **storage** and **exchange** of heterogeneous models of distributed applications

Generic methodology for modeling distributed applications

- *Mobile Agent Systems*, Active Networks, Information Systems

Elaboration of models

- Concepts : ODP (ISO/ITU-T Open Distributed Processing standard)
- Notation : UML and its extension mechanism (profile)
- Steps : based on the ODP viewpoints
- Process : for each viewpoint

Storage of models

- XML files (XMI) or Corba objects (MOF/IDL)

Exchange of models

- ODP and transformation of models

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Operational Specification (PSM : Platform-Specific Model)

Configuration of the Behavioral Specification (PIM) according to the considered environment

Model of the considered environment : Engineering specification

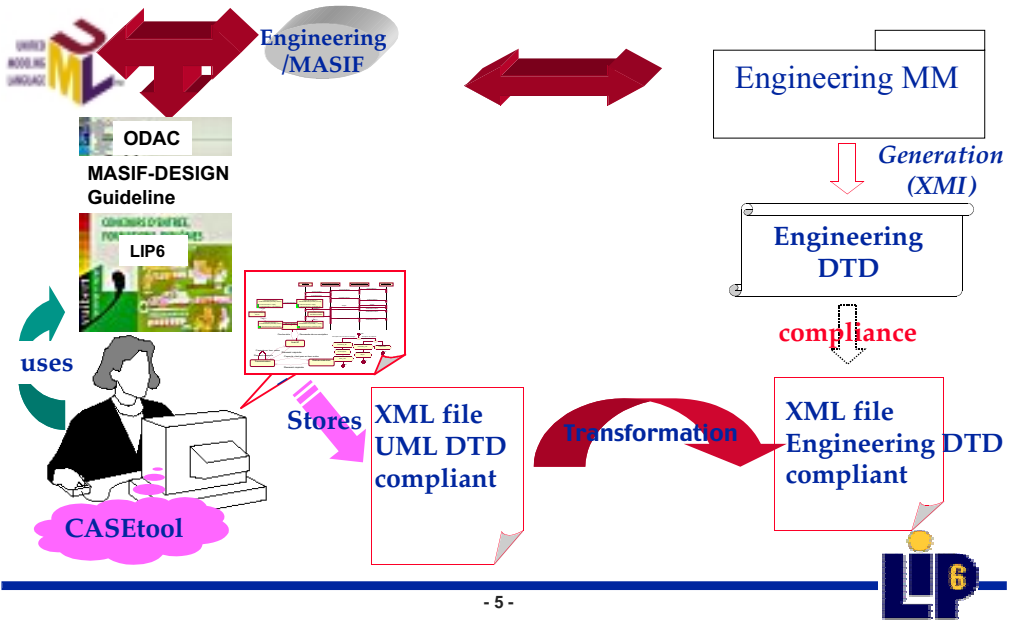
GuidelineS of Engineering specification : UML Profile

- Guideline « ODACforANTS » : Active Networks
- Guideline « MASIF-DESIGN » : Mobile Agent Platforms (MASIF Compliant)
 - ➔ *Stereotypes and tagged value attached to each platform element*
 - ➔ *Enables the designer to model the platform and the distribution transparencies*

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Using the MASIF-DESIGN Profile



The MASIF-DESIGN Profile Modeling the platform

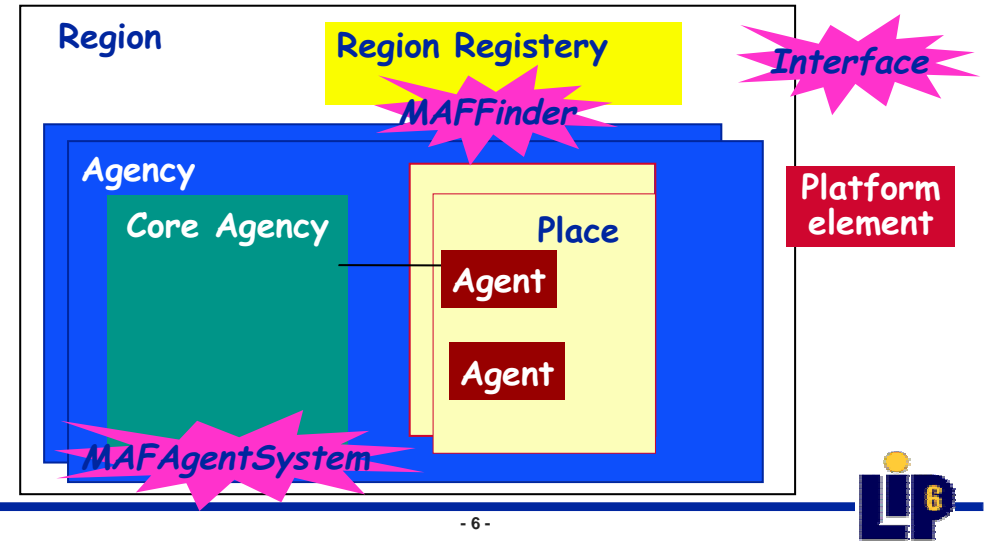
MASIF PF elements	UML Stereotype of
Region	Subsystem <<Region>>
Agent system	Node <<Agent System>>
Core agency	Subsystem <<Core Agency>>
Place	Package <<Place>>
Agent	Component <<Agent>>

Interfaces attached to each platform element

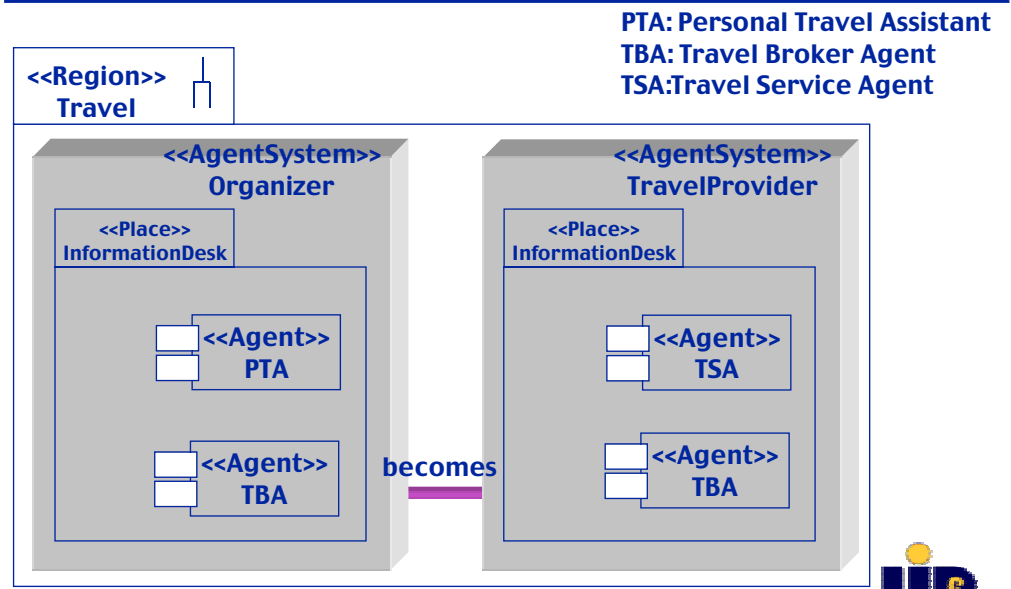


OMG MASIF Specification

Definitions and interfaces for interoperability between mobile agent systems



The MASIF-DESIGN Profile Example of modeling the platform



The MASIF DESIGN Profile Modeling Transparencies : Operations

Transparency	Operations	Interface	PF element
Access	LookupCommunicationServer()	IRegion	Region
Location	GetMAFFinder() Fetch_class() Lookup_agent()	MAFAgentSystem	CoreAgency
		MAFFinder	Region
Persistence	Deactivate() Flush() Save() SaveAgent() ReloadAgent()	AgentOperations	Agent
		IAgentSystem	CoreAgency
Relocation
Migration			

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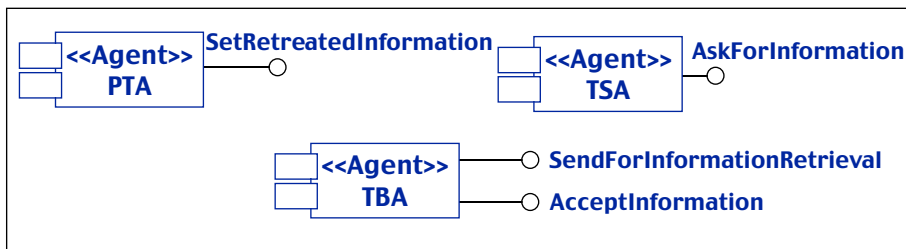


The MASIF-DESIGN Profile Example of Access transparency

Masks the invocation mechanism

Communication link establishment

- Operations: LookupCommunicationServer()
- Tagged Values: LinkInfrastructure (ex: IIOP, socket)
- Associated agent interface: IExportedAgent_NameOperation



Access rights

- Tagged values: SecurityProtocol, PolicyApplied, PolicyFile, Authority

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The MASIF-DESIGN Profile Modeling Transparencies : Tagged Values

Transparency	Tagged Value	PF element
Access	LinkInfrastructure SecurityProtocol	Agent, AgentSystem
	PolicyApplied PolicyFile	AgentSystem
	Authority	Agent
Location	Location FileDefinitionLocation	Agent
Persistence	Persistent AgentTimeout RepeatedSaveTimeout	Agent
	SystemPersistencyEnabled	AgentSystem

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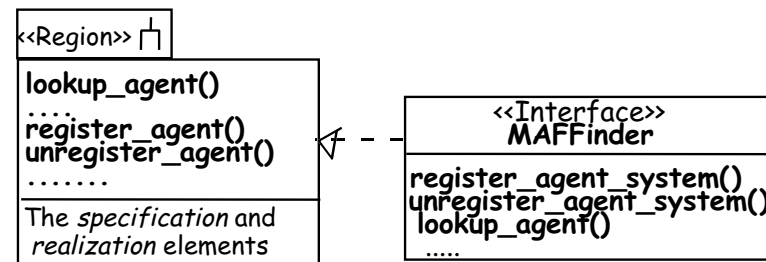


The MASIF-DESIGN Profile Example of Location transparency

Masks the location in space when binding agents

Location of the agent in the system

- To find a registered agent to a region : MAFFinder.lookup_agent()



Location of the resource file of an agent

- The resource file of the agent has to be known by the AgentSystem
 - ➔ Where ? The agent's tagged value FileDefinitionLocation
 - ➔ How ? MAFAgentSystem.fetch_class()

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ODAC methodology

- Separation of concerns of platform independent issues and platform specific issues
 - ➔ Behavioral specification guideline
 - ➔ Operational specification built from behavioral specification and engineering specification

MASIF-DESIGN guideline

- Considers standardized mobile agent platforms
- Uses a standard notation : UML Profile
- Permits the designer to take into account the platform constraints after the analyze phase
- Separates the concerns of non-functional properties such as mobility, persistency, transaction

Future work

- Relationship between behavioral and operational specifications
- Code generation from the operational specification

ODAC (in French)

M. P. Gervais (2000), *ODAC : une méthodologie de construction de systèmes à base d'agents fondée sur ODP*, rapport LIP n°2000/28, Laboratoire d'Informatique de Paris 6

M.-P. Gervais (2001), *Vers une méthodologie de construction de systèmes à base d'agents*, Actes de l'Atelier SMA de la plate-forme AFIA, Grenoble, France, pp19-27

The MASIF-DESIGN Guideline

F. Muscutariu and M.-P. Gervais (2000), *Modeling an OMG-MASIF Compliant Mobile Agent Platform with the RM-ODP Engineering Language*, In Proceedings of 2nd International Workshop on Mobile Agents for Telecommunication Applications (MATA'00), Paris, France, Lecture Notes in Computer Science n°1931, Springer Verlag, pp133-141

M.-P. Gervais and F. Muscutariu (2001), *Towards an ADL for Designing Agent-Based Systems*, In Proceedings of 2nd International Workshop on Agent-Oriented Software Engineering (AOSE'01), Montreal, Canada, to appear in Lecture Notes in Computer Science, Springer Verlag

F. Muscutariu and M.-P. Gervais (2001), *On the Modeling of Mobile Agent-Based Systems*, In Proceedings of 3rd IEEE/ACM International Workshop on Mobile Agents for Telecommunication Applications (MATA'01), Montreal, Canada, Lecture Notes in Computer Science n°2164, Springer Verlag, pp219-234

The ODACforANTS Guideline (in French)

S. Bouzitouna et al. (2001). *Création de services dans ANTS*. 4ème Colloque francophone sur la gestion de réseau et de service (GRES'01), Marrakech, Maroc