Next Generation Service Engineering

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Outline

- Current best practice MDE
- Trends and challenges
- Services and service models
- Next Generation Service Engineering
- Multimedia over IP (MMoIP) example
- Conclusions
Current Best Practice: Model Driven, Agent Oriented

Functionality models
- Active objects: UML, SDL
- State machines
- Asynchronous communication
- Agents reflecting the domain and the environment
- Focus on individuals

Application generation by model transformations

Realization
- Runtime support for the Design Architecture
- Distribution transparency and scalability
- Platform layering with edges
**Trends**

- *Unification* of underlying network technologies and computing platforms enabling network and service convergence.
- *Diversification* of services as well as equipments at the network edges.
- Shifting the business focus from connectivity and traffic to *services and content*.
- Shifting the development focus from system design to *service engineering* and end user value.
Service engineering challenges

- From *object orientation* to *service orientation*: precise service modeling, analysis and composition
- From network and platform focus to end-user focus
- From design time to run time composition and adaptation
- Supporting situation, personalization and policy
What is a service?

A service is:

*an identified functionality aiming to establish some goals/effects among collaborating entities.*

Captures:

- active services
- passive services
- end user services
- component interfaces (Web Services, CORBA, JINI, ...)
- layered functionality (ISO OSI)
Service essentials:

- Service is *functionality*; it is behavior performed by entities.
- Service imply *collaboration*; it makes no sense to talk about service unless at least two entities collaborate.
- Service behavior is *cross-cutting*; it imply coordination of two or more entity behaviors.
- Service behavior is *partial*; it is to be composed with other services.
Will contemporary SOA or WS be the solution to NGSE?

Only if
- passive services are all you need
- there is little need for statefull sessions
- you are not too worried about interoperability and performance
- you are happy to live in a concrete architecture

Because these “services” are essentially
- invocation interfaces bound to concrete components
- used for integration and distribution
- not for engineering end user and community services
Next Generation Service Engineering

Service models

Model transformation

Functionality models

Model transformation

Realization

NGN
Case study: MMoIP + Availability

- Service Availability
  - Exclusivity
  - Accessibility
- Cost
- User friendliness
- How to handle them all?
- What of external factors?
  - Threats
  - Overload
  - Delays
Case study: Models for MMoIP

- GRL for variability and strategy analysis
- UCM to specify and analyze scenarios
- UML 2 collaborations to specify and analyze services
- UML 2 collaborations as contracts for lookup and compatibility
- Policies to manage run-time adaptation
- GRL for monitoring and decision making at runtime
Case study: GRL Model for Availability
Evaluation of a GRL strategy

Service provider
- Overload
- Delay Level
- Accessibility
  - Provide Load Balancing
    - Cost
      - User Pull
      - Server Pull
    - Authorization
      - UTPA
      - UOPA
    - Authentication
      - MTPA
      - MOPA
  - Service Availability
    - Threat Level
      - Secure Location
        - User Friendliness
          - Service Availability

- Exclusivity
  - Make
  - Help
  - Hurt

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- 33
Use Case Maps with dynamic stubs for adaptation

If location = unsecure & …

If threatLevel = high & …
Then ServerPull

If threatLevel = high & …
Then UTPA
UML 2 Collaborations for service structure and behavior
Compositional adaptation by replacement and insertion using policy rules evaluated by agents upon role requests

Server Pull

User Pull

SecureMMoIP (Userpull)

<<replaces>>

{when threat level = 0 or location = secure}
{when threat level > 0 or location not secure}

User

Request MMoIP

Access Control Server

Authorization

Distribute Authorizations

Request MMoIP

Service Provider

UTPA

{when ...}
{when ...}

MMoIP

Request MMoIP

END MMoIP

END MMoIP
Actors playing collaboration roles

Using collaborations as contracts for:
- Dynamic Lookup
- Scalable compatibility validation

Managing dynamic role binding and adaptation using policy
NGSE in a nutshell

Introduce:
- Service models

and gain:
- Service analysis
- Design synthesis
- Service composition mechanisms
- Contracts for lookup and validation
- Adaptation to situation using policy
For more information

http://www.UseCaseMaps.org/

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