



Selecting Communication Services in a Service Oriented Network Architecture

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Motivation

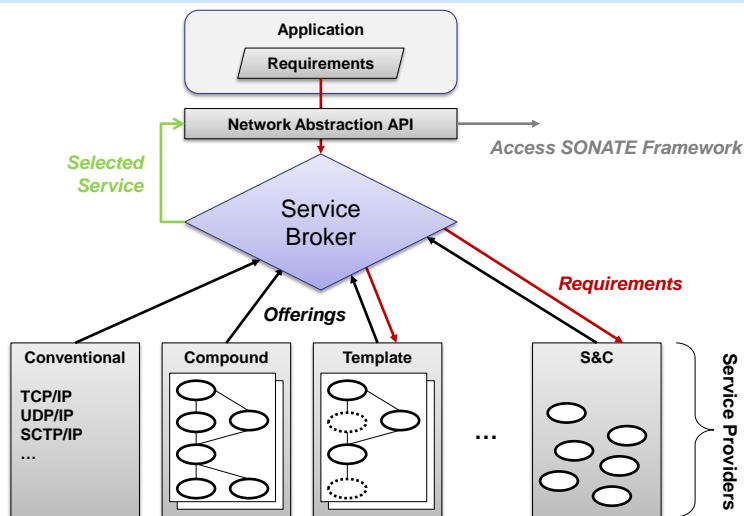
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- Why do we need to think about Service Selection?
- The number of Communication Services
 - Today: Limited (Services provided by TCP/IP protocols) and variety (IPv4, IPv6)
 - TLS/SSL/SSL, IPSec, selecting appropriate network adapter
 - Future: Much more (many providers will arise), many similar services
 - Today, services are different, selection is easy and can be done at design time
 - In future, deciding which service to select and use will be difficult



SONATE Architecture for Service Selection

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Requirements: Selection of Communication Services

- Service Description
 - For comparing requirements and offers
- Service Selection
 - For getting an appropriate service
 - For getting the best service

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Proposal: Selection of Communication Services (Service Description)

- Used to determine for a requested service:
 - which offered services are suitable (i.e. fulfils all compulsory requirements)
 - which suitable service is optimal (i.e. compare properties of service)
- Describe services using two types of properties*
 - Mandatory properties, attributes using absolute values
 - $\langle PropID, lower-bound, upper-bound \rangle$
 - Examples: compare MTU size, average Bandwidth, Costs, ...
 - Optional properties, attributes using absolute values
 - $\langle PropID, rating \rangle$ $rating \in [-9,9]$
 - Examples: decide to increase security vs. reduce delay

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* Bernd Reuther, Dirk Henrici "A model for service-oriented communication systems", Journal of Systems Architecture 54 (2008) 594–606

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Proposal: Selection of Communication Services

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- Service Selection
 - For getting an optimal service, optimization of optional properties are required
 - For example, security and delay of similar services
 - We need Multiple Criteria Decision Analysis (MCDA). Several algorithm exists for doing this.
 - One of them is Analytic Hierarchy Process (AHP) that is used for human decision making
 - AHP is adapted to provide an automatic process of service selection



Proposal: Selection of Communication Services

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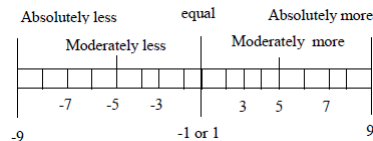
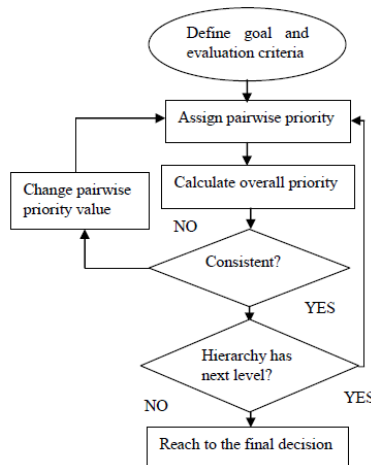


Fig. Pairwise comparison scale

Fig. Analytic Hierarchy Process (AHP)



Proposal: Selection of Communication Services

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- AHP in service description and selection
 1. Define the effects for selecting a service and assign pairwise priority.
 2. Calculate and pass the priority vector to the broker along with the requirements
 3. Calculate pairwise priority among the offered services. This requires a mapping mechanism which cannot be done by AHP.
 4. Calculate priority vector and the overall priority vector of the offered services
 5. Select the service with the highest priority.



Proposal: Selection of Communication Services

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- The priority assigned in requirements needs to be mapped to the offered services.
- Pairwise prioritization of services per effect
 - The mapping must be generic
 - The mapping should be monotonic
 - A linear mapping of measured values to prioritization is not adequate
 - An approach for mapping is proposed to use monotonic interpolation/extrapolation.

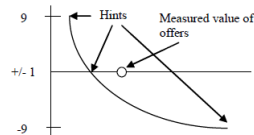


Fig. Values in terms of hints



Conclusions and Future Works

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- The problem was to select an appropriate communication service from a set of services offered by different service providers
- A description schema was extended to make use of an ontology for describing services and their properties
- The AHP was extended to select between similar services according to the clients requirements
- Other MCDA techniques can be investigated in future



Thank you

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