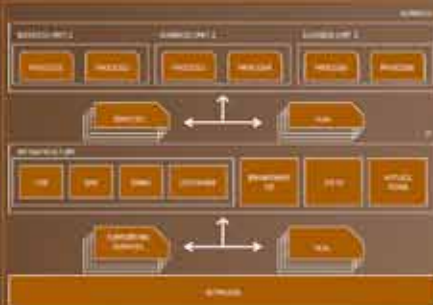


THE PROBLEM

IT systems grant a target availability level for the services they provide.

The components of the IT system are not directly controlled by the IT service unit (outsourcing):

- A contract regulates the provisioning of managing services from the outsourcer to the organisation
- There is a catalogue of the offered services comprising:
 - Service description
 - Availability level
 - Price



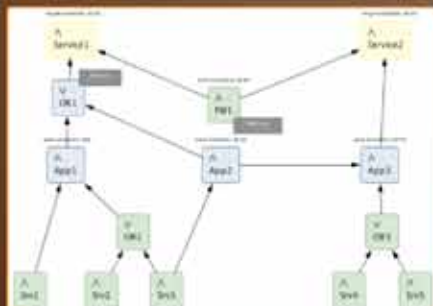
Determine:

- Minimum ensured availability level given the component's availability level
- Optimal allocation of component availability levels w.r.t. the business needs

THE A²THOS MODEL

We model the IT system by means of a dependency graph:

- Nodes: components of the architecture
- Availability dependencies
- AND/OR dependencies



Model nodes availability:

- Target availability: for services/processes
- Fixed availability: for non-outsourced nodes
- Variable availability: for outsourced nodes

An availability option set is a set of:

- Availability level (e.g., 99.5%)
- Top quantity (e.g., up to 5 servers)
- Cost (e.g., 1000 Euro)

ANALYSIS

Objective:

Given the availability level set on the components of an IT architecture, determine the worst-case availability level of IT services.

Which availability is used in the SLAs?

- Interval availability.
- Worst-case: according to the SLA each component cannot perform worst.
- Under the condition that the underlying services are available

How:

- For each service determine the nodes that influence its availability, based on the dependency graph.
- For every set of nodes determine the maximum unavailability given the nodes ensured availability level.
- Worst-case availability = 100% - maximum unavailability.

OPTIMISATION

Objective:

Determine the optimal choice of availability levels for variable availability components such that:

- the target availability level set on service/process nodes is met
- the cost is minimal

How:

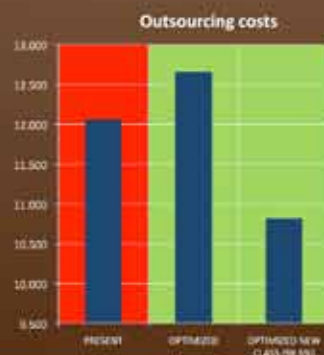
By solving an integer programming problem

APPLICATION

Two case studies at a large multinational company with outsourced IT:

1. IT system *already in use*: analysis
 2. IT system *in planning phase*: optimisation
- A supporting tool was developed.

SERVICE CODE	CALCULATED AVAILABILITY FIGURE	CONTRACTUAL AVAILABILITY FIGURE
Service 1	96%	99%
Service 2	99%	98%
Service 3	99%	99%
Service 4	98%	98%
Service 5	96%	99%
Service 6	97%	98%
Service 7	99%	98%



CONTRIBUTIONS

- Availability analysis based on *dependency graphs*, easily obtained from the *IT architecture*.
- A technique to determine the worst-case availability *without* using traditional *failure rate* and *repair rate* parameters.
- Used to solve a *real-world* IT management problem.

LIMITATIONS

- Unable to determine *how often* the worst case will happen.
- For the *probability* that service availability is less than a given figure, failure and repair rates are needed.

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