AN APPROACH TO AGENT-BASED MANAGEMENT OF SERVICE PROVISIONING ORIENTED SYSTEMS

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MOTIVATION

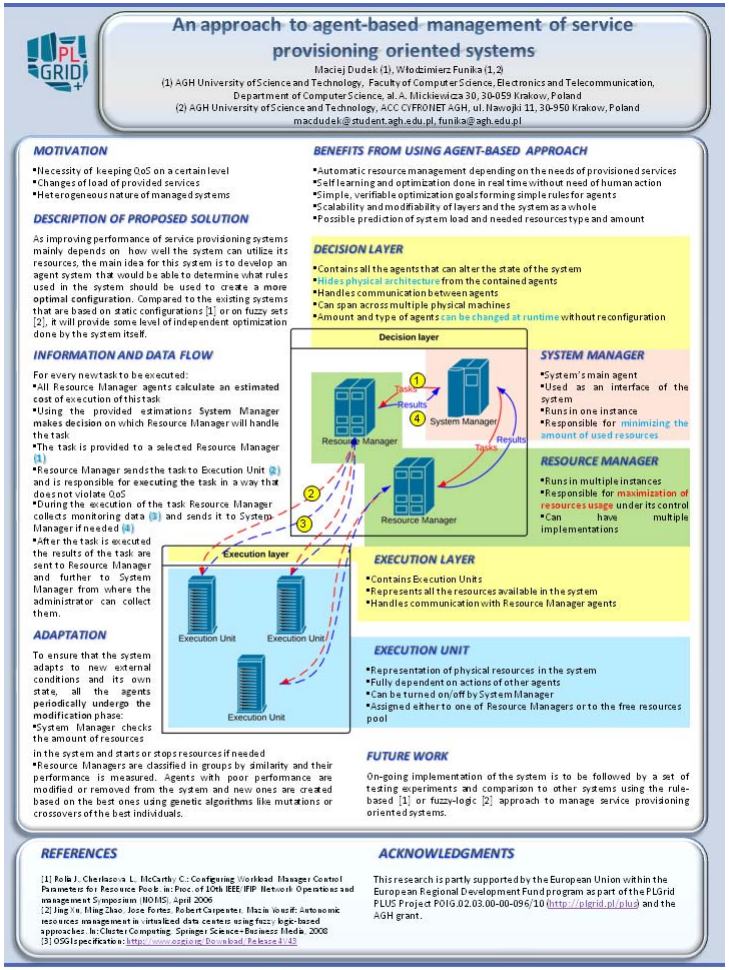
- Necesity of keeping Qos on certain level
- Changes of load of provisioned services
- Heterogeneus nature of managed systems
- Need of automation of administrator tasks

BENEFITS FROM PRESENTED SOLUTION

- Automatic resource management depending on the needs of provisioned services
- Self learning and optimization done in real time without need of human action
- Simple, verifiable optimization goals forming simple rules for agents
- Scalability and modifiability of layers and the system as a whole
- Possible prediction of system load and needed resources type and amount

OUR POSTER

We invite you to our poster.



An approach to agent-based management of service provisioning oriented systems

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- Necessity of keeping QoS on a certain level
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DESCRIPTION OF PROPOSED SOLUTION

As improving performance of service provisioning systems mainly depends on how well the system can utilize its resources, the main idea for this system is to develop an agent system that would be able to determine what rules used in the system should be used to create a more optimal configuration. Compared to the existing systems that are based on static configurations [1] or on fuzzy sets [2], it will provide some level of independent optimization done by the system itself.

INFORMATION AND DATA FLOW

For every new task to be executed:
- All Resource Manager agents calculate an estimated cost of execution of this task
- Using the provided estimations System Manager makes decision on which Resource Manager will handle the task
- The task is provided to a selected Resource Manager (1)
- Resource Manager sends the task to Execution Unit (2) and is responsible for executing the task in a way that does not violate QoS
- During the execution of the task Resource Manager collects monitoring data (3) and sends it to System Manager if needed (4)
- After the task is executed the results of the task are sent to Resource Manager and further to System Manager from where the administrator can collect them.

ADAPTATION

To ensure that the system adapts to new external conditions and its own state, all the agents periodically undergo the modification phase:
- System Manager checks the amount of resources in the system and starts or stops resources if needed
- Resource Managers are classified in groups by similarity and their performance is measured. Agents with poor performance are modified or removed from the system and new ones are created based on the best ones using genetic algorithms like mutations or crossovers of the best individuals.

BENEFITS FROM USING AGENT-BASED APPROACH

- Automatic resource management depending on the needs of provisioned services
- Self learning and optimization done in real time without need of human action
- Simple, verifiable optimization goals forming simple rules for agents
- Scalability and modifiability of layers and the system as a whole
- Possible prediction of system load and needed resources type and amount

DECISION LAYER

- Contains all the agents that can alter the state of the system
- Hides physical architecture from the contained agents
- Handles communication between agents
- Can span across multiple physical machines
- Amount and type of agents can be changed at runtime without reconfiguration

SYSTEM MANAGER

- System's main agent
- Used as an interface of the system
- Runs in one instance
- Responsible for minimizing the amount of used resources

RESOURCE MANAGER

- Runs in multiple instances
- Responsible for maximization of resources usage under its control
- Can have multiple implementations

EXECUTION LAYER

- Contains Execution Units
- Represents all the resources available in the system
- Handles communication with Resource Manager agents

EXECUTION UNIT

- Representation of physical resources in the system
- Fully dependent on actions of other agents
- Can be turned on/off by System Manager
- Assigned either to one of Resource Managers or to the free resources pool

FUTURE WORK

On-going implementation of the system is to be followed by a set of testing experiments and comparison to other systems using the rule-based [1] or fuzzy-logic [2] approach to manage service provisioning oriented systems.

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