



Self-Organising, Self-Managing Heterogeneous Clouds

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CloudLightning (www.cloudlightning.eu)

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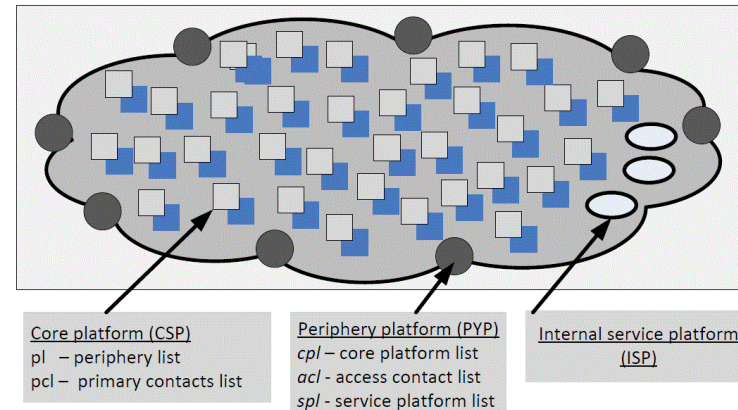
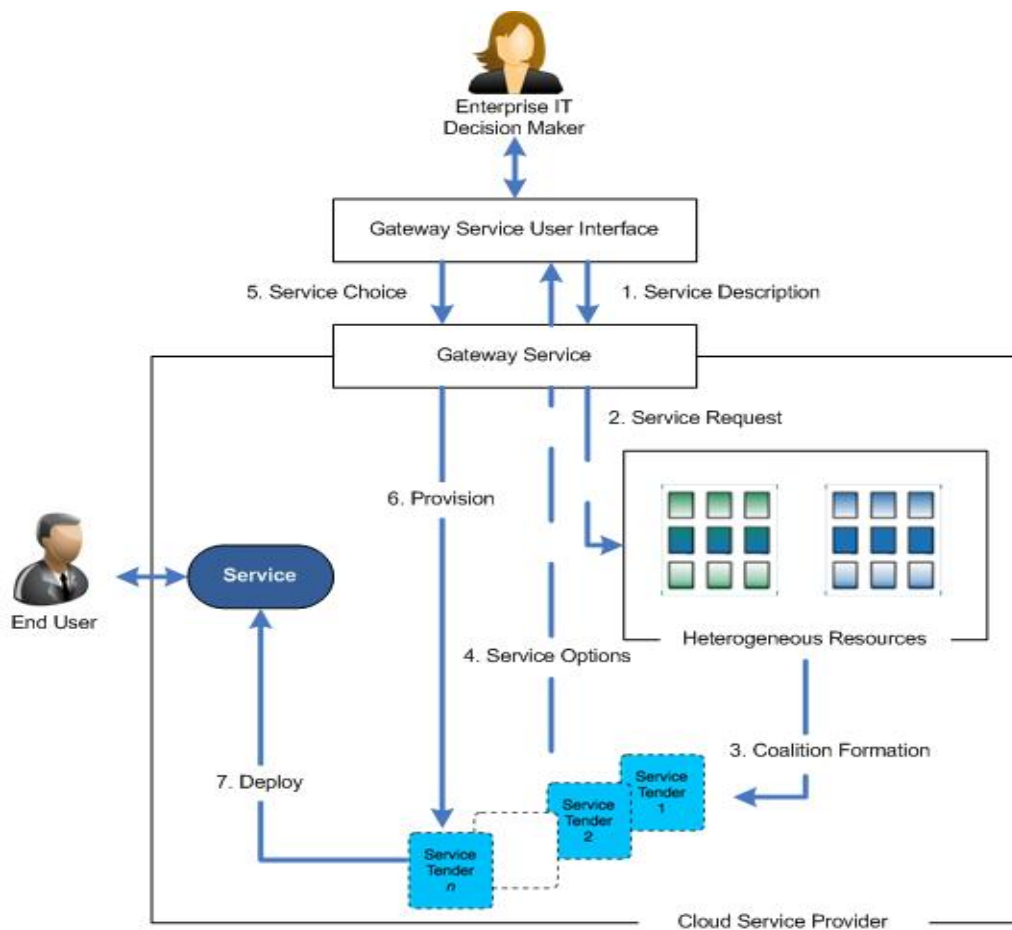
Project Goals and Ambitions

- ▶ Make Cloud Computing more accessible to the average customer.
- ▶ Allow the provider to make their offering more efficient
 - ▶ The current model is not sustainable. *The cloud is now approaching 10% of the world's electricity consumption.*
- ▶ Exploit resource heterogeneity
- ▶ Demonstrate our approach in HPC2

How we propose to do it...

- ▶ Managing complexity of this scale can be done using self-organisation
 - ▶ Synergetic activities of elements when no single element acts as a coordinator and the global patterns of behaviour are distributed
 - ▶ Prevalent in Nature
 - ▶ Already being used to develop many control systems, sensor networks, economic systems, ...

How we propose to do it...



1. The Enterprise IT Decision Maker requests a service by writing a service description.
 2. The Gateway Service forwards this description to the heterogeneous resources and requests tenders for that service.
 3. Coalitions are formed in response and
 4. these tender options are presented to the IT Decision Maker.
 5. The IT Decision Maker chooses an option and informs the Gateway Service.
 6. The relevant coalition is provisioned and
 7. deployed for use.
- The End User then interacts with the deployed service.

How we propose to do it ...

- ▶ **Basic tenets:**
 - ▶ component autonomy
 - ▶ awareness of the environment
 - ▶ goal-driven behaviour of individual components
 - ▶ self-configuration
- ▶ **Goals include:**
 - ▶ minimize energy consumption
 - ▶ maximize revenues.
- ▶ **Goals achieved by collaboration**
- ▶ **Self-configuration**
 - ▶ allows the system to *create coalitions* of core servers working in concert to *respond to the needs of a service request* rather than offering a menu of a limited number of resource packages.