PaaS Cloud Migration
Migration Process, Architecture Problems and Solutions

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Cloud Migration Motivation

HOW TO MIGRATE TO CLOUD

IaaS  PaaS  SaaS
Cloud Migration Definition

A cloud migration process is a set of migration activities carried to support an end-to-end cloud migration.

Implications of definition to be considered:

- initial requirements and expectation elicitations
- tools for automated migration of IT artefacts
- plans for the deployment of new cloud services
- decommissioning of old infrastructure.
Cloud Migration Use Cases

**SaaS Provider**
- On Premise
- Analysis data views
- Analysis data master and control
- Evaluation middleware
- Definition business objects & data model
- Implement data migration
- Cloud Solution

**PaaS Provider**
- On Premise
- Business Level costing and operation analysis
- Infrastructure architecture scoping and definition
- Architecture statelessness and data externalisation
- Development pricing, support and marketing
- Cloud Solution

**IaaS Provider**
- On Premise
- Assessment & Planning process, reference cases, flow
- Architecture mapping, pre-testing, proofing
- Delivery & Production architecture, functions success criteria: milestones/metrics
- Cloud Solution
Cloud PaaS Migration

Consultation with ISV CEO

- Analysis: motivation discovery
- Discussion: change implications

Business - FROM classical licensing model TO SaaS

ISV PaaS Infrastructure Assessment and Requirements

- Business Level: costing and operation analysis
- Infrastructure: architecture scoping and definition
- Architecture: statelessness and data externalisation
- Development: pricing, support and marketing

Technical - FROM local TO virtualised (self-hosted, or better 3rd party-hosted) TO public configuration (3rd-party hosted, data centres)

ISV Developer and Software Development

- Re-engineering/Development: stateless architecture
- Re-engineering/Development: data externalisation

Technical - FROM on-premise environment TO cloud data centres

ISV Provisioning

- Migration: PaaS-level infrastructure
- Migration: SaaS-level infrastructure

Business - FROM Installation TO PaaS access channels (for clients)
PaaS Migration Solutions

- A **basic solution** – without quality gains – would replicate the existing server in a virtual world, i.e. essentially just running and maintaining applications elsewhere in the cloud, but not delivering performance gains that the cloud allows.

- The **scalable solution** -- **Stateless programming** and the separation of data from processing are solutions as well as **NoSQL data representation**.
In a migration process, architecture and programming need to be embedded into:

- **methodological process** support, e.g. through enhanced questionnaires about the infrastructure used, complexity of programs and data, etc.

- **analytical /diagnostic tools** supporting dependency analysis and other preparations for the actual re-engineering and refactoring.

Scalability (scale-out/down) and performance as a cloud benefit
PaaS Migration Techniques

Migration Techniques:

• Programming Models for Stateless Programming
• Databases for State Management
• Data Externalisation for Resiliency

This results in an identification of some key solution components

• the first two address **elasticity and scalability**,
• the third addresses **resiliency**.
PaaS Migration Concerns

- **Elasticity**: how well (such as quickly, automatically) the system can adapt to workload. For providers, elasticity implies the ability to move resources across different infrastructure dynamically, which is in relation to scale out.

- **Scalability**: the capability of the system to accommodate larger loads by adding resources either making hardware stronger (scale up) or adding additional nodes (scale out).
PaaS Migration Concerns

- **Resiliency**
  - refers to dependability and fault tolerance.
  - For providers, this means to avoid failure through building in redundancy and loose coupling into a solution.
PaaS Migration Test Case

10 servers
serving 1000
users

1

...
PaaS Migration Test Case

10 servers serving 100 users
PaaS Migration Test Case

1 server serving 100 users?
PaaS Migration Test Case

Problem!
Sticky Session State (Statefulness)

1 server serving 100 users?

1

10

10

…
Concerns emerge that potential users and also providers do not properly understand and address.

- **Technical:**
  - Stateless components and data externalisation are required if cloud advantages like elasticity are to be gained.
  - Re-architecting and modernisation is often necessary if more than data transfer into the cloud is the migration scope.

- **Business:**
  - IT staff need more skills in integration, configuration, security.
  - Energy efficiency and cost reduction
Conclusions

• **Activities and steps** across different layers point to a common set of migration tasks that can be assembled to match needs of the different deployment layers, but also provider and user types.

• The discussion has highlighted immaturity of established procedures and availability of **tools**.

• Important challenges arising from our observations include the importance of **adequate architecture design** for the cloud, but also the implications in terms of changed business models.
A Perspective

• A plan arising from the migration pattern catalogue:
  • Patterns are templates applied in a concrete situation.
  • A migration pattern is more specific than the processes described.

• Quantifying the cloud benefits:
  • re-engineering and modernisation techniques needs to be quantified.
thank you