The cloud as a vehicle for innovation in the financial industry
Belgian Finance Club
25 February 2019
Agenda

1. Why?

2. How?

3. What?

4. Who, when?
The cloud is a vehicle for innovation in the financial services industry

Three major innovation domains: (1) improvement of customer facing services, (2) optimization of product operations, finance and risk management, and (3) workforce innovation.

<table>
<thead>
<tr>
<th>Customer Intimacy</th>
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<tbody>
<tr>
<td>▶ Real time</td>
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<tr>
<td>▶ Any Time Any Where Any Time,</td>
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<tr>
<td>▶ Advanced personalization</td>
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<tr>
<td>▶ Chatbot</td>
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<tr>
<td>▶ Open Ecosystem integration</td>
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<td>▶ Integration with IoT</td>
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<table>
<thead>
<tr>
<th>Operational Excellence</th>
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<tbody>
<tr>
<td>▶ Radically reduce finance liquidity processing time</td>
</tr>
<tr>
<td>▶ Raise compute utilization from 10% to actual units consumed for Risk Analytics</td>
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<tr>
<td>▶ Rapid provisioning of compute power for Valuation Services</td>
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<tr>
<td>▶ Advanced analytics</td>
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<td>▶ From RPA to Smart Automation</td>
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<th>Collaboration</th>
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<tr>
<td>▶ Implement new technology applications based on user requirements and increasing mobility demand</td>
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<td>▶ Improve end user driven collaboration (maximize productivity)</td>
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Innovation stems from reduced costs, increased agility and reach

- Avoid lost time for slow deployment
- Ease of bringing new functionality
- No capital cost to new ideas without the analysis of end game before starting
- Try fast, fail fast, at low cost of failure
- Rapid iteration on success

- Fore-knowledge of scale isn’t needed
- Easy to scale up with customer uptake
- Easy to scale down with demand
- Continuous improvement by iterating small changes drives high efficiency

- Business agility with improved speed to respond to change
- Accelerate time-to-market and time-to-value
- Data driven, real-time adaptation with closed-loop feedback mechanism

- Abstraction of Infrastructure with commensurate economics
- Increasing acceptance of Cloud costs in rate base
- Only pay for what business used with clear mapping between cost & business values

- Capitalize on new ideas from outside the organization
- External Apps integration with simple data exchange
- Deliver contextual & personalized customer offerings

- Deliver to local and global markets
- Engage customers anywhere and anytime through any device
- Extend technical reach – innovation platform of choice built on huge R&D investments of Hyper-scale Cloud providers
The cloud enables to transform hardware into software, with the concept of infrastructure as code

```
provider "hcp" {
  region = "eu-west-1"
}

resource "hcp_dbs_cluster_instance" "my-postgresql" {
  count = 2
  identifier = "${var.environment}-my-postgresql-${count.index}"
  cluster_identifier = "${hcp_dbs_cluster.my-postgresql.id}"
  db_subnet_group_name = "${hcp_db_subnet_group.my-postgresql.name}"
  engine = "cloud-postgresql"
  engine_version = "10.4"
  instance_class = "db.r4.large"
}

resource "hcp_dbs_cluster" "my-postgresql" {
  cluster_identifier = "${var.environment}-my-postgresql"
  engine = "cloud-postgresql"
  engine_version = "10.4"
  db_subnet_group_name = "${hcp_db_subnet_group.my-postgresql.name}"
  database_name = "demodb"
  master_username = "root"
  master_password = "verysecure"
  vpc_security_group_ids = ["sg-demo"]
  storage_encrypted = true
}

resource "hcp_db_subnet_group" "my-postgresql" {
  name = "${var.environment}-my-postgresql"
  subnet_ids = ["a-subnet-id"]
}
```

Datacenter

Encrypted Database

Private Network

2 Large Machines
How does it work?

Cloud computing is a new paradigm where resources are available on-demand and on a pay-per-use basis to enterprises and users.

- Rapid elasticity
- Pay per usage (utility model)
- Pooled resources
- Available on Demand

► Cloud computing uses the internet to access someone else's software running on someone else's hardware in someone else's data center.
► Industry swings between centralized computing models (mainframe of 1960s) to host-centric ones ("client-server" technology of 1980s). Cloud computing is a logical extension of the dot-com era web app - further enabled by advances in bandwidth, datacenter architecture, and large-scale storage.
► There are five defining characteristics of cloud computing: on-demand, broadly accessible, pooled, elastic, and metered.
The cloud can be delivered and deployed differently, based on service models and deployment models.

Three types of services, with four deployment models (Public / Private / Hybrid / Community Cloud):

<table>
<thead>
<tr>
<th>Technology Components</th>
<th>On/Off-Premises</th>
<th>Infrastructure as a Service (IaaS)</th>
<th>Platform as a Service (PaaS)</th>
<th>Software as a Service (SaaS)</th>
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<tbody>
<tr>
<td>Applications</td>
<td>Virtualization</td>
<td>Applications</td>
<td>Virtualization</td>
<td>Applications</td>
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<tr>
<td>Data</td>
<td>Servers</td>
<td>Data</td>
<td>Servers</td>
<td>Data</td>
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<tr>
<td>Runtime</td>
<td>Storage</td>
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<td>Storage</td>
<td>Runtime</td>
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<tr>
<td>Middleware</td>
<td>Networking</td>
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<td>O/S</td>
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The tradition approach of deploying and using business software in-house by the enterprise. System is developed and installed, supporting infrastructure hosted internally.

Combining executing operating systems, storage, messaging, databases, load balancing, networking, failover, redundancy, etc., together so that the customer buys a service rather than having to architect and specify how such infrastructure should be configured and deployed.

Include security, authentication, authorization, transaction management, code execution, powerful domain specific languages, and point and click configuration that replaces traditional software languages.

Provides the capability to the consumer to use the provider’s applications running on a cloud infrastructure. The applications are accessible from various client devices through a thin client interface such as a web browser.
We believe that cloud adoption will undergo three major waves of adoption.

Wave 1: Adoption of commodity systems targeting specific functions

Wave 2: Integration and security of cloud solutions

Wave 3: Wide-spread deployment of solutions designed for cloud-only

Wave 1: Challenges Faced:
- Developing a cloud strategy
- SaaS implementation
- IaaS implementation

Wave 2: Challenges Faced:
- Hybrid architectures
- SaaS integration
- Migration of legacy systems
- Cloud security
- Data center evolution
- IT operating model evolution
- Cloud governance

Wave 3: Challenges Faced:
- Vertical PaaS solutions
- Identity & access management
- Business continuity management
- Service management integration
- IT-as-a-Service (ITaaS)
Banks using Cloud have deployed it in average at 20% of their IT landscape – none have passed 50%

CLOUD ADOPTION ROADBLOCKS

While Cloud is well-supported by regulators, adoption in the banking industry stays low. Here are some of our key findings:

01 Clarity over regulatory compliance
   What controls are required to be compliant across regions?
   How do I evidence compliance?
   How do I keep on top of changing regulations?

02 Data classification and data governance
   How do I classify data?
   How do I handle different classifications?
   What controls do I need to cover the entire data lifecycle?

03 Operational risk management
   How do I monitor and manage the flow of data in & out?
   How do I manage the proliferation of shadow IT?
   How do I measure and report the operational risk?
Thank you