



# The Cloud Business Case

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April 24, 2015



# Economics

- I know. Boring, but it must be said.
- This is what you need to do in order to argue your case for your boss.

## A Scale of Different Deployment Models:

- Traditional Internal IT
- Colocation
- Managed Service
- Cloud Model



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## A Scale of Different Deployment Models:

- Traditional Internal IT
  - All IT infrastructure is capital expenditure
- Colocation
- Managed Service
- Cloud Model



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## A Scale of Different Deployment Models:

- Traditional Internal IT
- Colocation
  - You pay for the hardware,
  - but place it at a colocation facility
  - Facility provides Power, Cooling, Rack Space, Network connectivity, Backup power, Physical Security
  - Turns some of these into operational expenditures
- Managed Service
- Cloud Model



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## A Scale of Different Deployment Models:

- Traditional Internal IT
- Colocation
- Managed Service
  - As Colocation, but you also rent the servers and networking hardware
- Cloud Model



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## A Scale of Different Deployment Models:

- Traditional Internal IT
- Colocation
- Managed Service
- Cloud Model
  - As in a Managed Service, but you rent *virtualised resources*.
  - Therefore, you only pay for what you use.



# Example

Let's say you need:

- 2 firewalls:  $2 \cdot 1500\text{€} = 3000\text{€}$
- 6 commodity servers:  $6 \cdot 3000\text{€} = 18\,000\text{€}$

You also need (not counted in example):

- a Room to keep your stuff in
- an Internet Connection
- a Rack Cabinet
- a Network Switch
- Load Balancing
- Cooling
- Someone managing the hardware
- Licenses for your software
- ...



# Example: Internal Deployment

## Internal Deployment

	3 000€	Firewalls
+	<u>18 000€</u>	Servers
=	<u>21 000€</u>	Total Capital Expenditure
/	<u>36</u>	Depreciation over 3 years
=	<u>600€</u>	Cost per month





# Example: Cloud Deployment

## Cloud Deployment

	20\$	per month for 2 Firewalls / Load Balancers
+	<u>60\$</u>	per month 6 Servers
=	80\$	Total Operational Expenditure <i>per month</i>



# Understand your requirements

- In order to make your business case, you need to *understand your requirements*
- Understanding your requirements is about understanding the *quality requirements* of your cloud application.
- Some quality requirements are more in focus than others



# Cloud Quality Requirements

- Scalability
- Reliability / Availability
- Performance
  - Storage
  - Capacity
  - Bandwidth
- Security
- Privacy
- Cost Optimisation

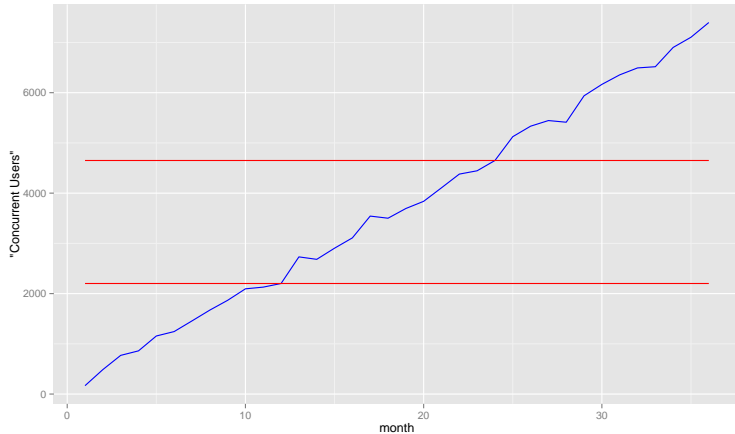


# Quality Requirements are Time Dependent

- In traditional deployment, you pick one service level and dimension your solution accordingly.
- This may mean a trade-off that during extreme peak hours you consciously do not meet your quality requirements targets.
- In a cloud solution, you can always spin up more machines as a consequence of (planned) peaks.
- Therefore, you need to view your quality requirements over time – often with a per-hour granularity.



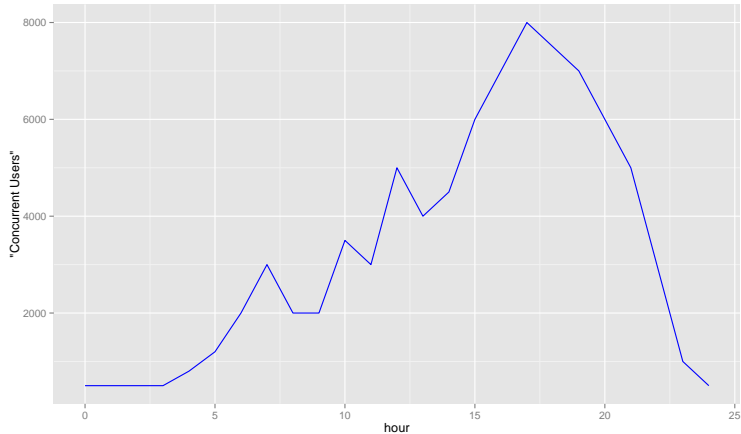
# Example, Scalability



Average number of Concurrent Users per Month, expected growth scenario.



# Example, Scalability



Number of Concurrent Users per Hour and Day, measured.



# Scalability

- Max / median number of concurrent users
- Max / median acceptable response time
- Burst rates & times
- Max / median latency

At any given time, this influences:

- The number of required servers
- The computing power of these
- The bandwidth requirements
- The speed of your storage devices
- The size of your storage devices



# Reliability and Availability

- Transient failures
- Upgrades without downtime
- Continuous monitoring and logging of application's health
- Backups
- Recovery
- Migration
- Data persistency

Availability (may) require:

- That your cloud resources have sufficient storage for backups
- That you have additional storage resources for long-term backups
- That you use (slow) long-term storage in tandem with faster storage solutions.
- That you distribute your application over several datacenters
- That you implement loadbalancing between your servers on different datacenters.





# Reliability and Availability

- Transient failures
- Upgrades without downtime
- Continuous monitoring and logging of application's health
- Backups
- Recovery
- Migration
- Data persistency

Also:

- What does the cloud provider promise in terms of uptime?



# Performance

- Similar to Scalability:
- Computing power
- Storage response times
- Storage capacity
- Network bandwidth

At any given time, this influences:

- The number of required servers
- The computing power of these
- The bandwidth requirements
- The speed of your storage devices
- The size of your storage devices



# Security

- Data security
- Hosts security
- Network security

Things to look out for:

- What promises do your cloud provider make wrt. storage persistency?
- What services are provided to maintain your server platform, especially security patches?
- Is it possible for other users of the same cloud vendor to get at your site “from behind”?



# Privacy

- Where is your data stored?
- Under what circumstances would your cloud provider have to give up your data (e.g. as a response to a subpoena)?
- What measures do \*you\* need to take to protect the privacy of your users?
- What do your cloud provider promise?



# Summary

- Your quality requirements determine:
  - the cloud infrastructure you need
  - the support structure around the servers you need from your cloud provider
- In turn, this determines what you must pay
- Arguing for *why* you need that service level, and what it will cost you is your business case.
- *Best(?) Alternative Investment*: What will it cost you to host your servers yourself?
- Remember: With a cloud solution you can have a much finer time granularity, and spin up servers to only deal with e.g. peak hours.