

Cloud Computing and Big Data

Cloud overview and introduction

Oxford University
Software Engineering
Programme
July 2020

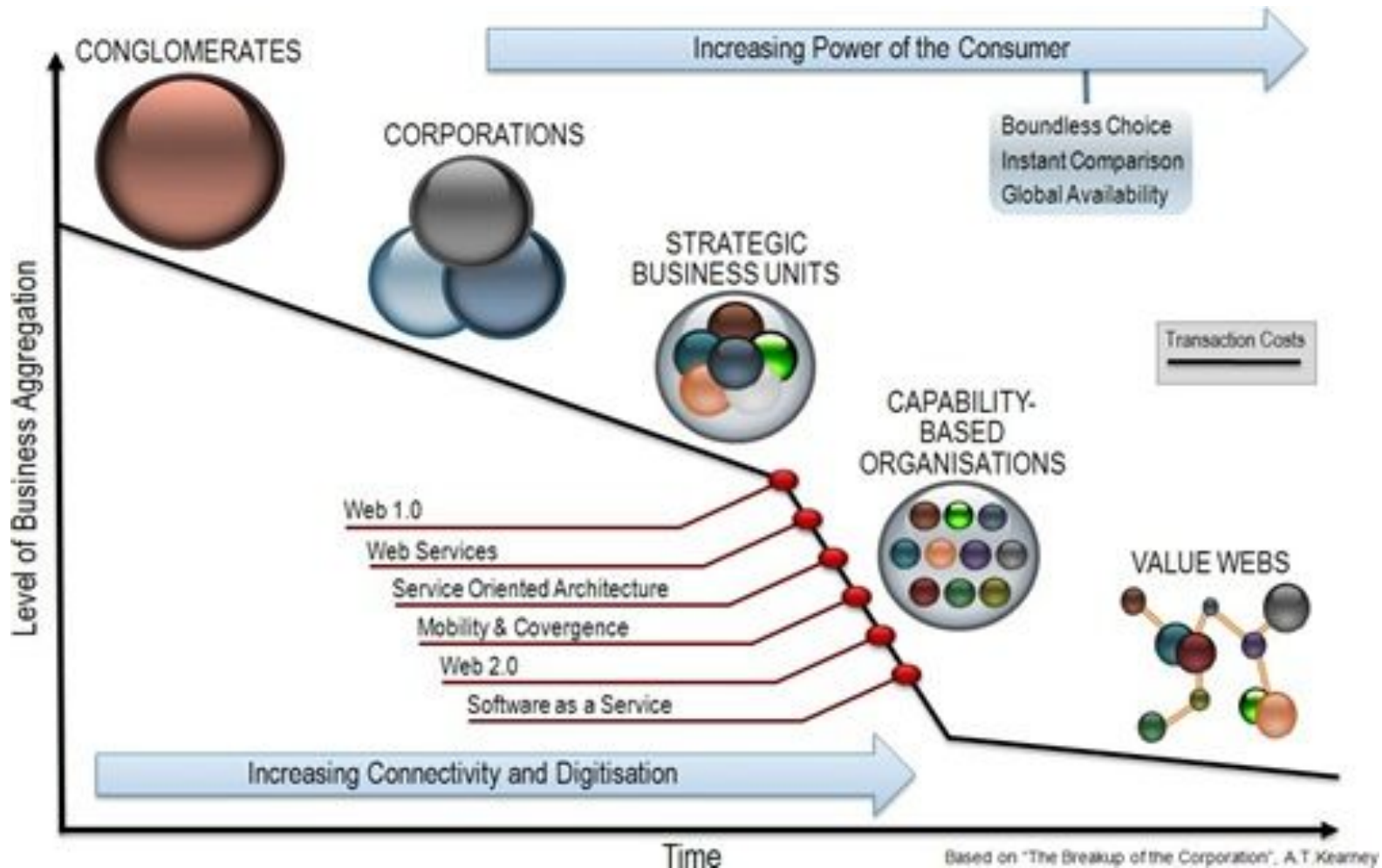


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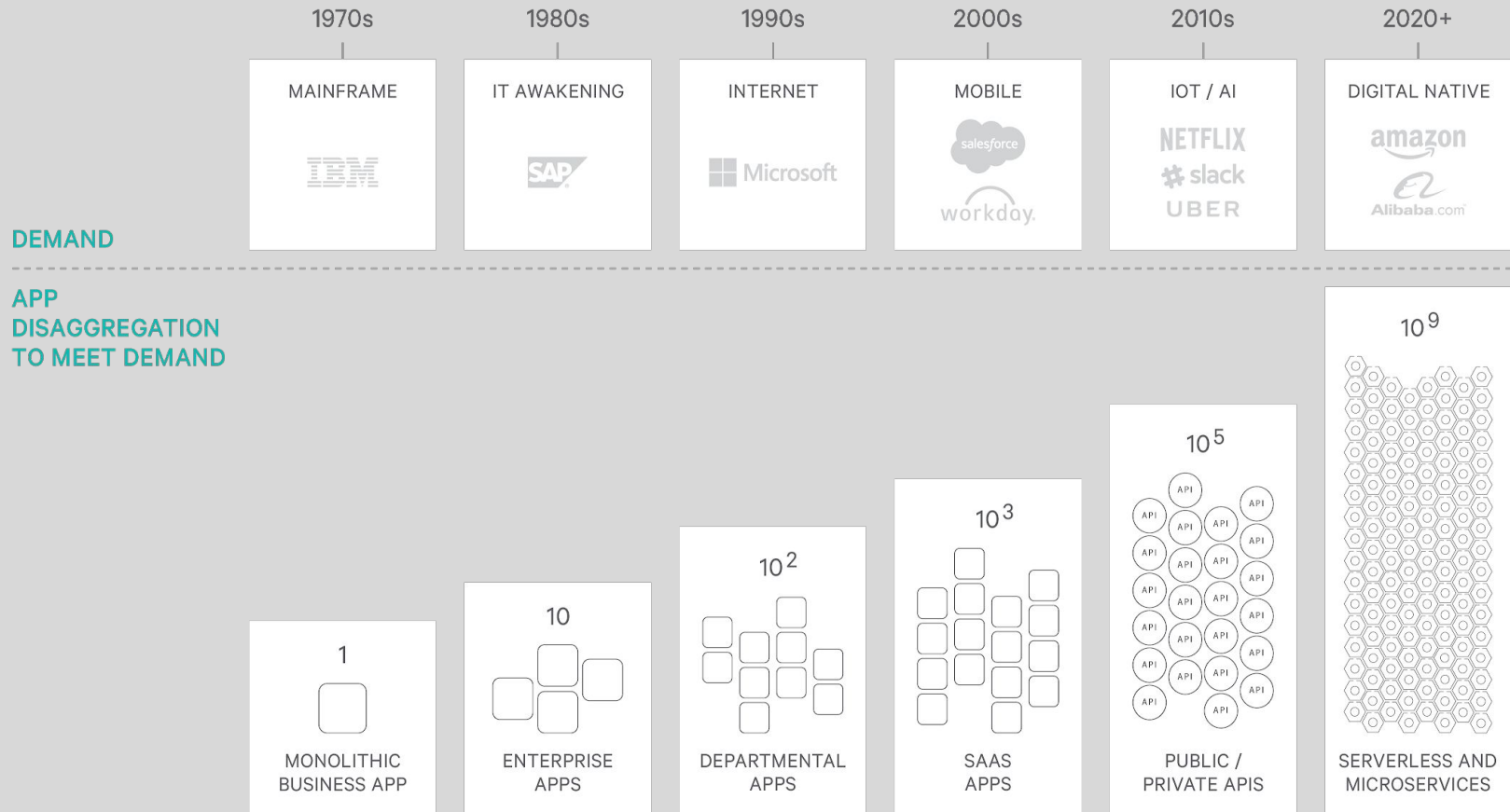
- Definitions
- Origins of Cloud Computing
- Case Studies and Motivations



Drivers for a new IT model



Increasing disaggregation



What is Cloud?

- Depends who **you** are
 - **My daughter**: iCloud (her music in the cloud)
 - **My mum**: gmail (her email in the cloud)
 - **My VP sales**: Salesforce (his prospects in the cloud)
 - **Sysadmin**: Amazon/Rackspace/etc (his infrastructure in the cloud)
 - *****: what *you* care about, self-provisioned, managed, metered and paid per use, in the cloud

Cloud Computing Definition (NIST)

- On-demand self-service
 - Users can provision resources without human intervention
- Broad network access
 - Heterogeneous access to resources
- Resource pooling
 - Multi-tenant shared capabilities
- Rapid elasticity
 - Services can scale up and down automatically
- Measured service
 - Resources can be metered and charged for based on real-world measures



Cloud Native

<http://pzf.fremantle.org/2010/05/cloud-native.html>

- **Distributed/Dynamically Wired** (works properly in the cloud)
 - Supports deploying in a dynamically sized cluster
 - Finds services across applications even when they move
- **Elastic** (Uses the cloud efficiently)
 - Scales up and down as needed
 - Works with the underlying IaaS
- **Multi-tenant** (Only costs when you use it)
 - Virtual isolated instances with near zero incremental cost
 - Implies you have a proper identity model
- **Self-service** (in the hands of users)
 - De-centralized creation and management of tenants
 - Automated Governance across tenants
- **Granularly Billed and Metered** (pay for just what you use)
 - Allocate costs to exactly who uses them
- **Incrementally Deployed and Tested** (seamless live upgrades)
 - Supports continuous update, side-by-side operation, in-place testing and incremental production



New definition of Cloud Native

- From the Cloud Native Computing Foundation
 - Container based
 - Dynamic
 - Microservice oriented

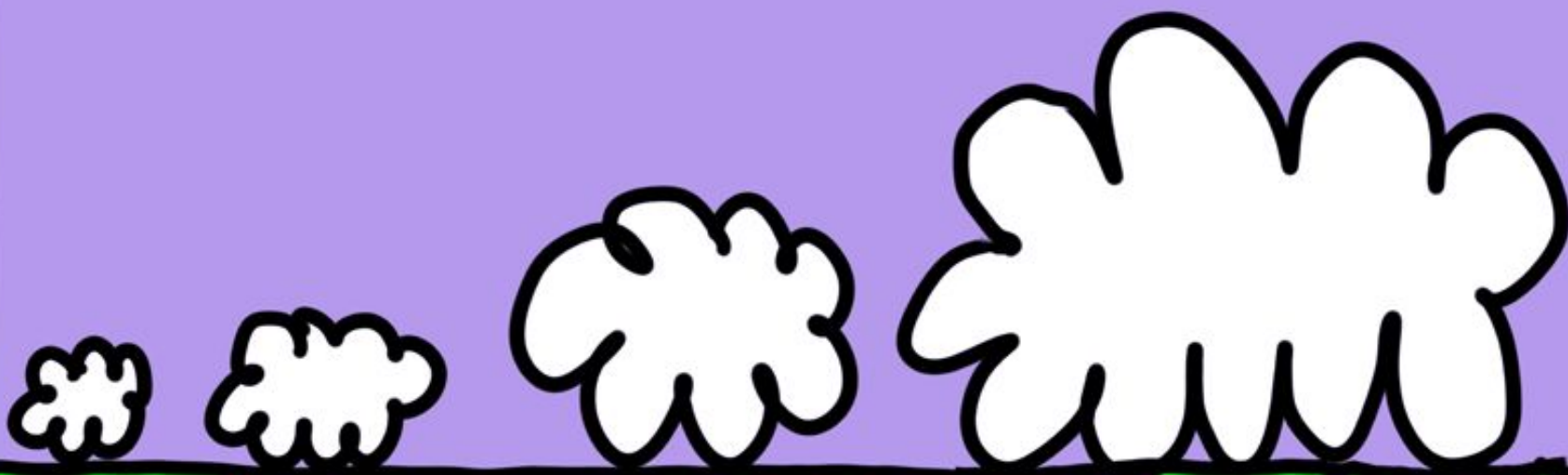


Origins of Cloud Computing

- Virtual Machines on Mainframes
 - VM/370 – 1972
- Grid Computing
 - Grid computing is the collection of computer resources from multiple locations to reach a common goal.
- Software-as-a-Service
 - Salesforce.com 1999
- Amazon AWS
 - 2002

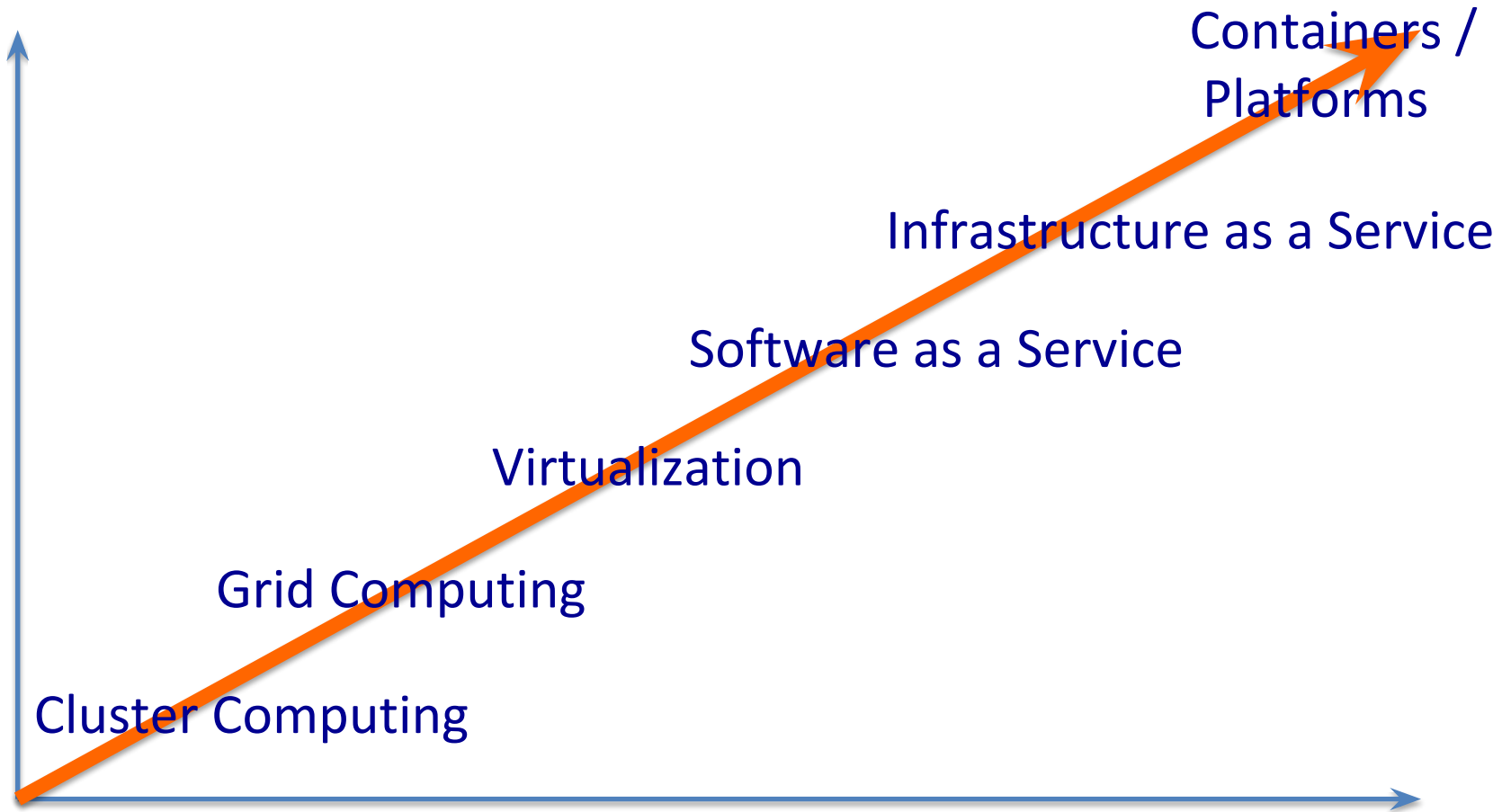


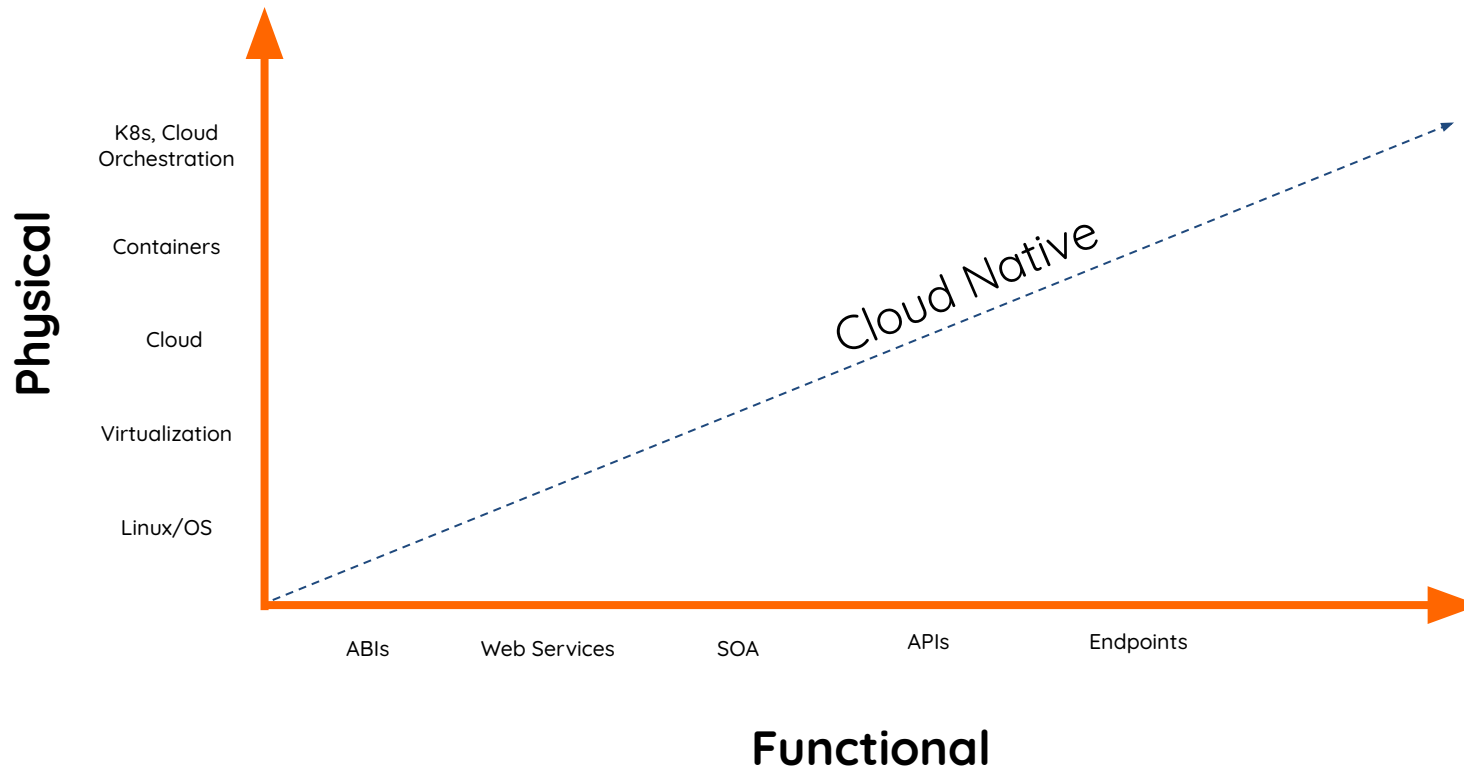
the evolution of the cloud:



@gapingvoid

Evolution of Cloud





CASE STUDIES



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Netflix - Watch TV Program

https://signup.netflix.com

Offline Mail Inbox (124,820) - p WSO2 WSO2, Inc. - Calend + bitmark Shorten with bit.ly Gmail - Inbox (720)

NETFLIX

Questions? Call 0800 096 6379 - 24

Buy / Redeem Gift Member

1 MONTH FREE TRIAL

Watch TV programmes & films anytime, anywhere.

Only £5.99 a month.

Start Your Free Month

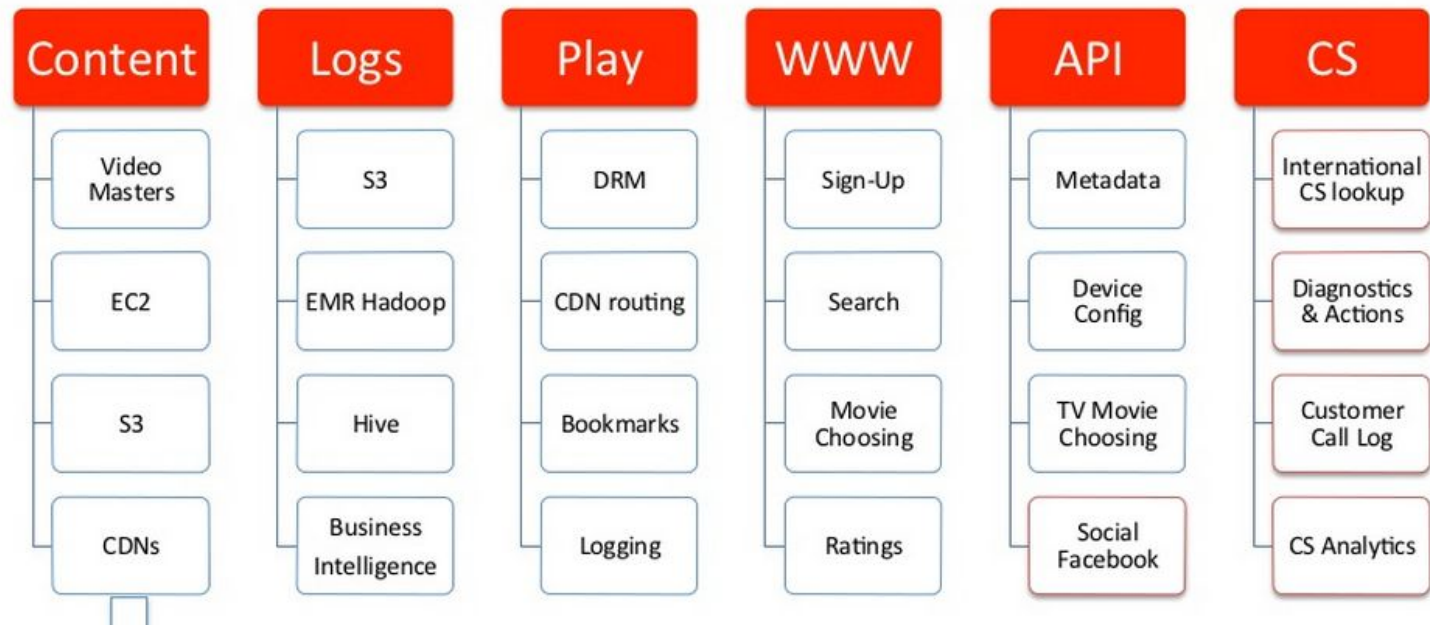
The image is a screenshot of the Netflix website's sign-up page. At the top, there's a browser window with the address bar showing 'https://signup.netflix.com'. Below the browser window is a red header with the Netflix logo on the left and a phone number 'Questions? Call 0800 096 6379 - 24' on the right. There are also links for 'Buy / Redeem Gift' and 'Member'. The main body of the page features a large banner with a family (a man, a woman, and two children) sitting on a couch, looking at a large TV screen. The TV screen displays a grid of various movie and TV show covers, including titles like 'TAXI', 'KATIE MAC', 'NATHAN', 'hold social', 'ZEN: ZACK', 'KENYA', 'CONTRACT', 'APRIL 10TH', 'ROCKY', 'JULIE', and 'drama yaga'. To the left of the family, there's a yellow circular badge that says '1 MONTH FREE TRIAL'. To the right of the badge, the text 'Watch TV programmes & films anytime, anywhere. Only £5.99 a month.' is displayed in a large, bold, white font. Below this text is a blue button with the text 'Start Your Free Month' in white.

Netflix

- A REST and Cloud based SOA approach
- Continuous Delivery
- 100% Based in the cloud
- See excellent presentations from Adrian Cockcroft
 - e.g.
<http://www.slideshare.net/adrianco/global-netflix-platform>



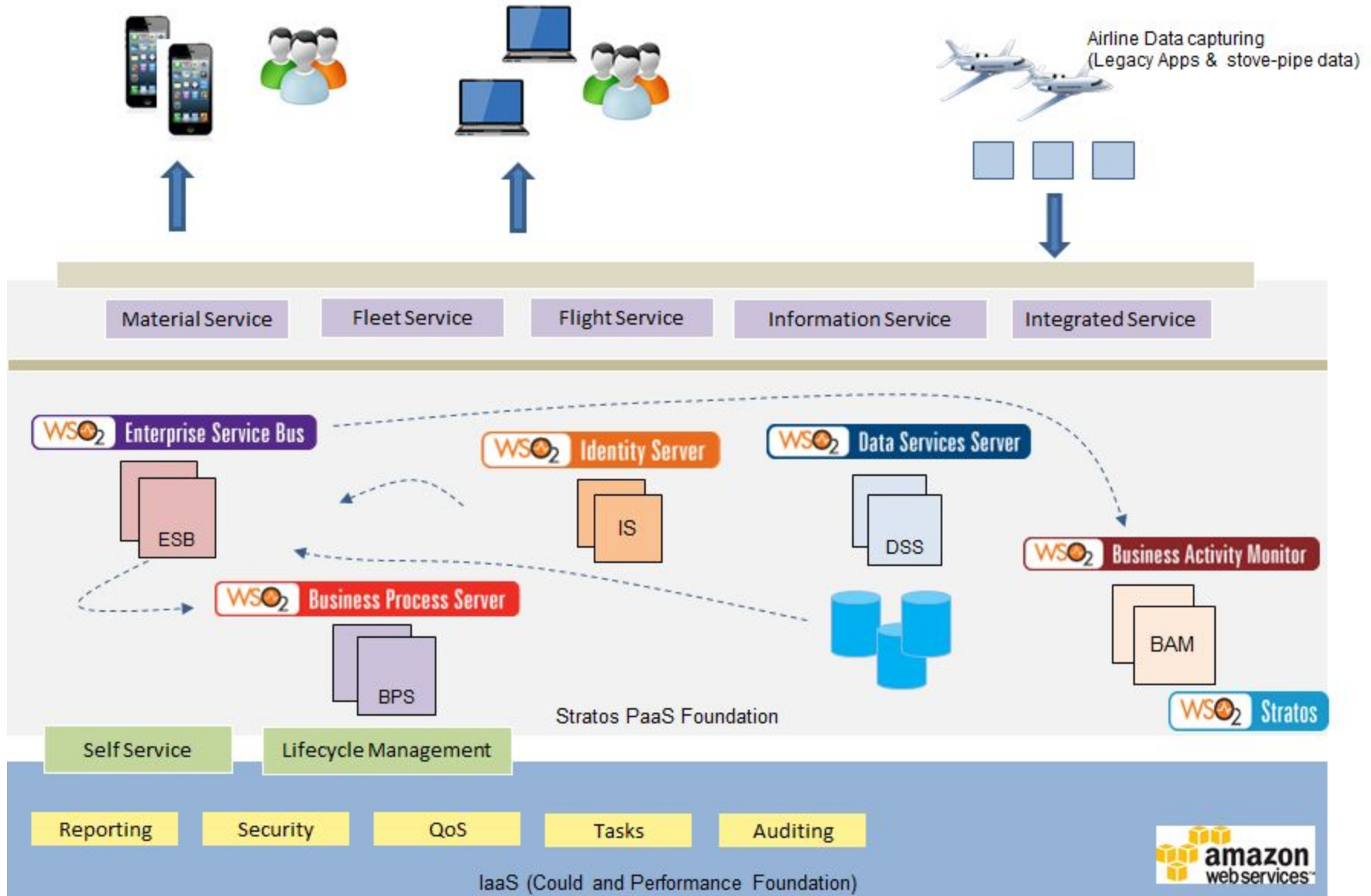
Netflix Deployed on AWS



Boeing Digital Airline



Case Study : Boeing - A PaaS based Integration and API ecosystem



Case Study : Multi-tenanted Mobile Orchestration Gateway Platform

Customer

One of the largest global networking solutions providers required to build a mobile services orchestration gateway platform, enabling mobile providers to simplify QoS service access to their external business partners.

Challenge

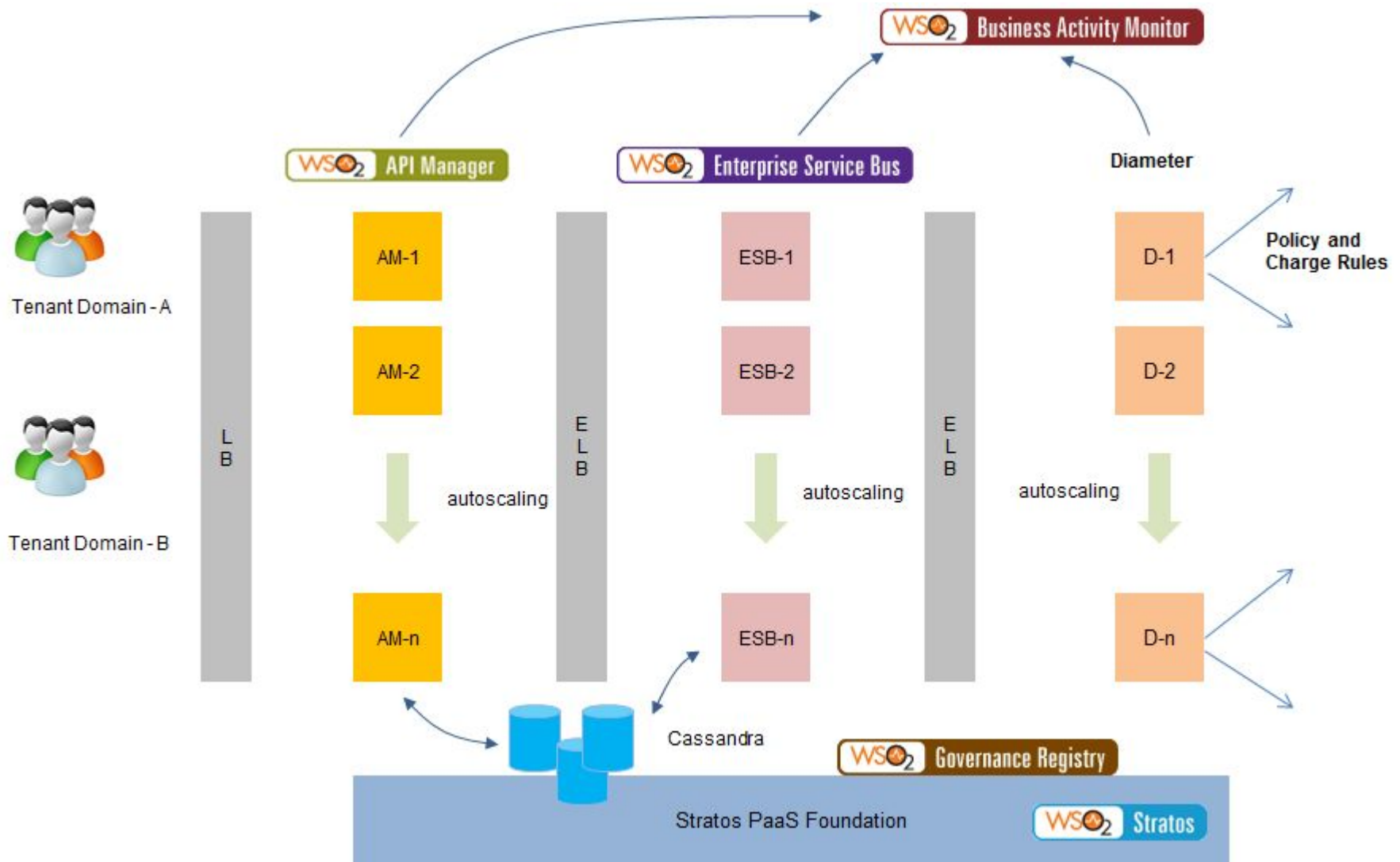
- Build a mobile services orchestration gateway than can scale upto 40,000 TPS with 99.999% service availability.
- Extensible architecture capable of interfacing with multiple protocols such as XMPP, Diameter whilst maintaining pre-defined SLAs and throughput.
- Integrating with ASR5000K, Third-party PCRF systems
- Multi-tenancy support for API lifecycle management.
- Multi-geographical deployment with autoscaling and failover compensation.

Solution

- Rebuilt an 18 month project in 4 weeks
- API Governance powered by multi-tenanted API Manager cluster with enforced security and lifecycle management.
- Business logic through ESB mediators exposed as REST APIs.
- Stateful caching using Cassandra
- Analytics and monetization of API usage using BAM integrated with enterprise licensing platform.
- Partner Onboarding interfaces and authorization workflows.
- Enterprise-grade cloud deployment based on Stratos PaaS foundation with native support for multi-tenancy, resource pooling and elastic scaling.



Case Study : Multi-tenanted Mobile Orchestration Gateway Platform

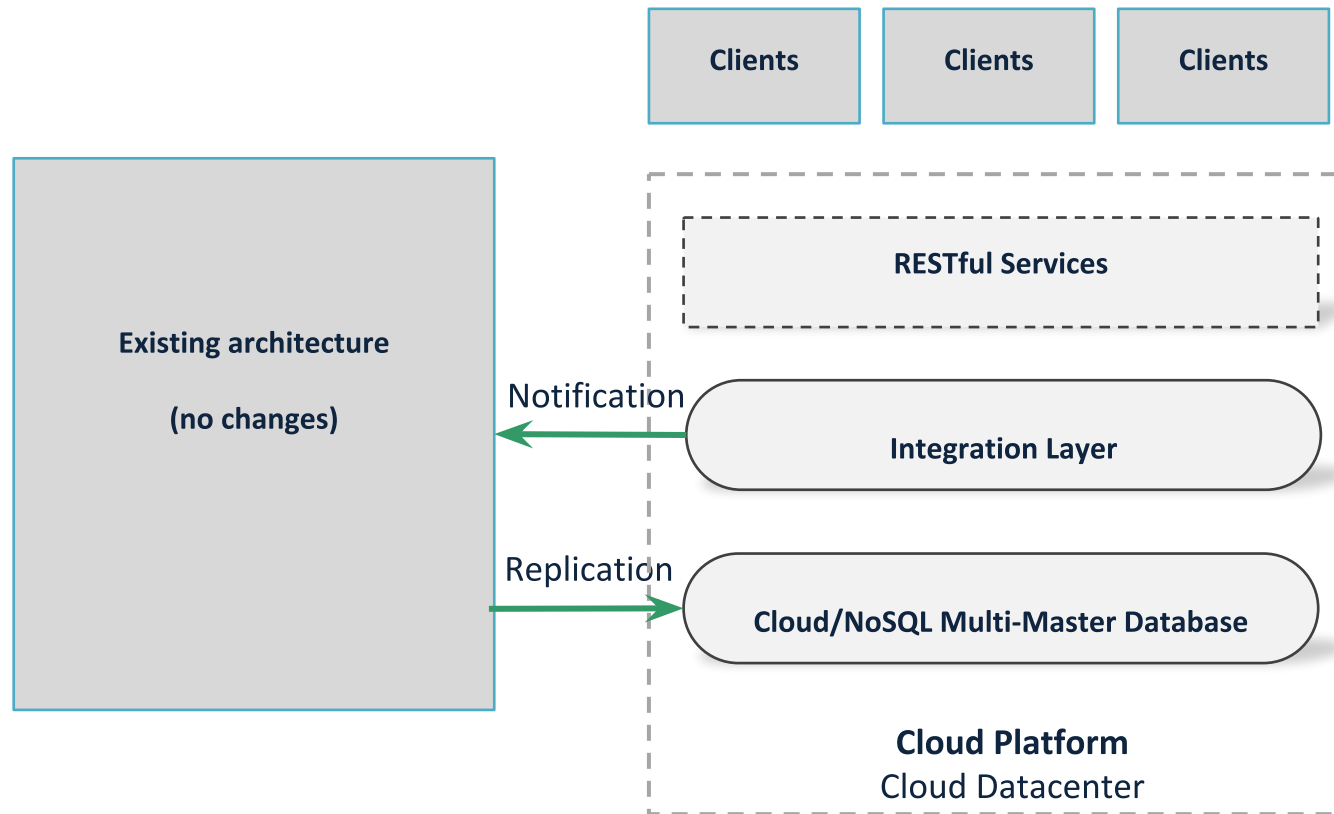


Pay TV company

- Needed to scale up to provide instant pay-as-you-go on mobile devices
- Support Disaster Recovery (DR)
- Elastic Scale e.g. during an important football match



Architecture



Summary

- Motivations to move to cloud
- Pay as you go models
- Fundamental shift to cloud-native
- Case studies



Questions?



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