Cloud Migration

Is it really that scary?

Version 1.1

AND Digital

Agenda

Here's what we are covering today…

- **Who am I?**
- **What is Cloud & Cloud Native Services?**
- **Cloud Migration Strategies & Approaches**
- **Migration Use-cases**
- **Business impacts**
- **Summary**

…Warning – Migration to Cloud can be very context specific, so what we are covering are the general concepts, approaches & use-cases. As such, your mileage from this session may vary…

Experience Highlights

Dr. Tim Payne | LinkedIn

Senior Architect
HCL, EMEA

Reporting to HCL's Chief Architect, Tim worked as a specialist / non-specialist consultant & architect for HCL clients as required.

Specialising in DevOps, Agile, Process Engineering & SW, Tim helped clients plus internal HCL groups implement DevOps solutions, Agile & Process roadmaps as required.

The scope of typical DevOps engagements included - discovery, architecture, microservice/IaC implementation & SRE

Lead DevOps Architect
IKEA, Sweden

Working as an HCL consultant in IKEA, Tim was involved in many different projects & initiatives in IKEA around their "New Web" project.

He was primarily responsible for their CM strategy & implementation, their DevOps strategy & implementation, their ERM strategy & general troubleshooting as required.

He helped lay down the foundation for IKEA's DevOps transformation strategy which affected over 200+ of their products.

Principal Architect
Microfocus, UK

Working as a Principal Architect for a number of Microfocus' key products, Tim was responsible for setting product architecture, working with clients to help set product roadmaps & work with senior management to deliver products to strategic clients.

Tim also worked at Microfocus in a number of other roles over the years including - Development Manager, Principal Software Engineer, Principal DBA & Senior Consultant.

KEY CLIENTS

- BP
- Bank Of Ireland
- CVS
- HCL
- IKEA
- Microfocus
- THALES

INDUSTRY EXPERTISE

- eCommerce
- Retail
- Pharmaceutical
- Defence
- Federal
- Banking
- IT Consulting & SW
- GCP Certified Cloud Architect

TOOLS

- Databases - various (RDBMS)
- Programming languages - various
- CI/CD/DevOps tooling - various
- GCP, Azure, AWS
- IaC tooling - various
- CM - SCM/HCM – various

Tim Payne

DevOps Lead/Principal
"The Generalist"

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OVERVIEW

Tim joined AND in June 2021 bringing with him many years of experience in Architecture, DevOps, Software Design & Implementation

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CORE FOCUS

DevOps, Cloud & Architecture Best Practice

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KEY SKILLS

DevOps | Architecture | SW Engineering Agile | Process Engineering | CM (SCM & HCM) | IaC | Microservices

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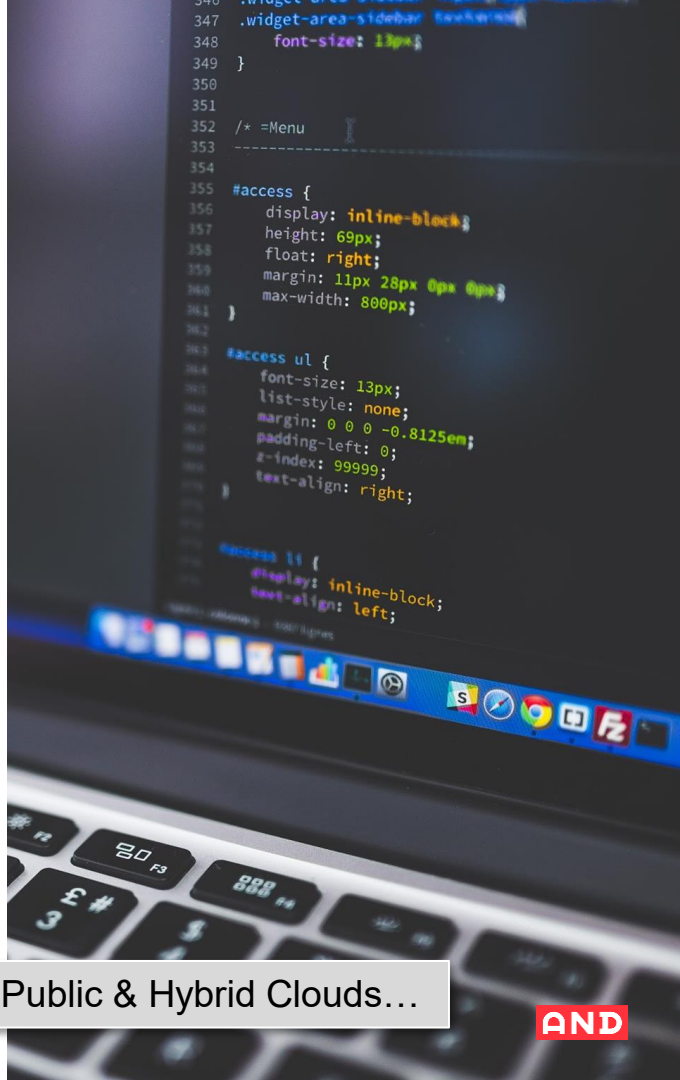
1 What is Cloud & Cloud Native Services?

First off, what is the “Cloud”?

Let’s start this session by defining what the “Cloud” is & some common terminology used in the space…

Simply put, the “Cloud” is a set of “pay as you go” infrastructure & other services hosted by a “***Cloud Provider***” that can be rented on a “as needed” basis

Cloud Types	Description…
Public Clouds	• These are when Cloud services are available for anyone to rent, e.g. AWS
Hybrid Clouds	• Which are when environments include both “on-premise” & Cloud hosted services or infrastructure working together
Private Clouds	• Which are when Cloud services are built, owned & used exclusively by a single organisation



…We will be focusing on Public & Hybrid Clouds…

What is a “Cloud” Provider?

A Cloud Provider is simply someone who...

- Hosts the infrastructure & services that are rented by an organisation
- Is responsible for investing in & maintaining those services (CapEx)
- Charges consumers based on those services that they use (OpEx)

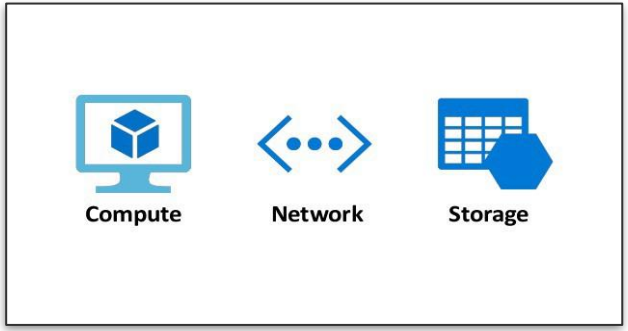
...So, why Cloud? Cost. In the long-run, it is often cheaper for organisations to rent what they need (OpEx) rather than build it (CapEx)...

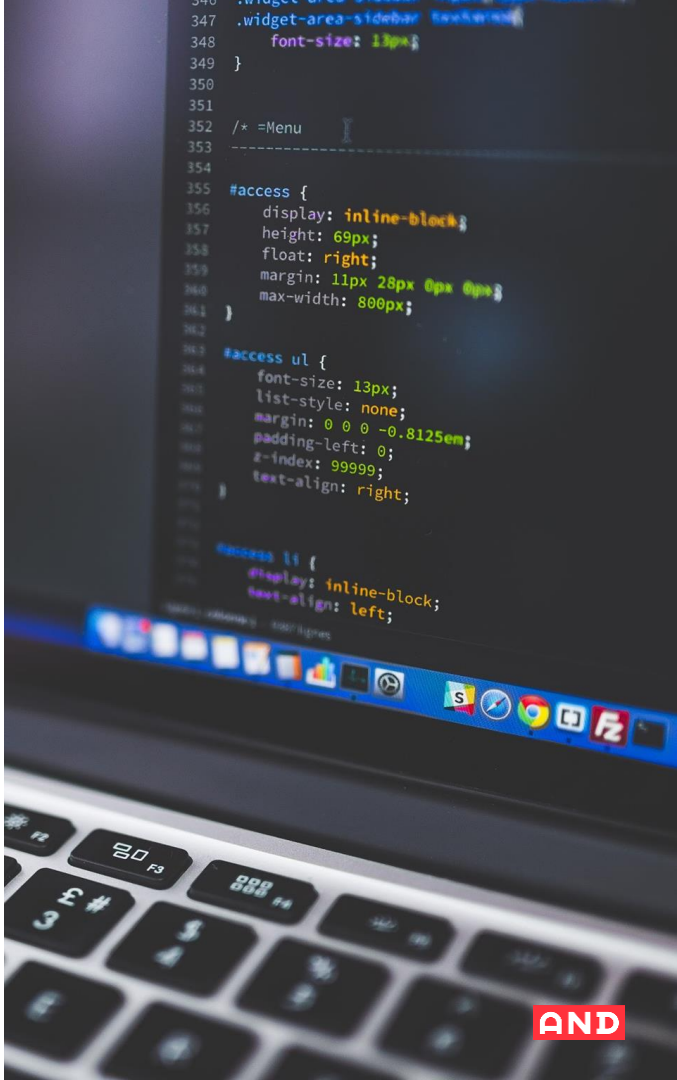
Lastly, what are “Cloud Native Services”?

“***Cloud Native Services***” refer to services & infrastructure that are hosted by ***Cloud Providers***. They are often split into 3 main types….

- ***Compute services*** - The “do” services like VMs, application servers etc.
- ***Network services*** - The “connect” services like VPNs, LBs & routers
- ***Storages service*** - The “data” services like databases, disk storage etc

…There are others of course, but these are the main types that we will be covering today…



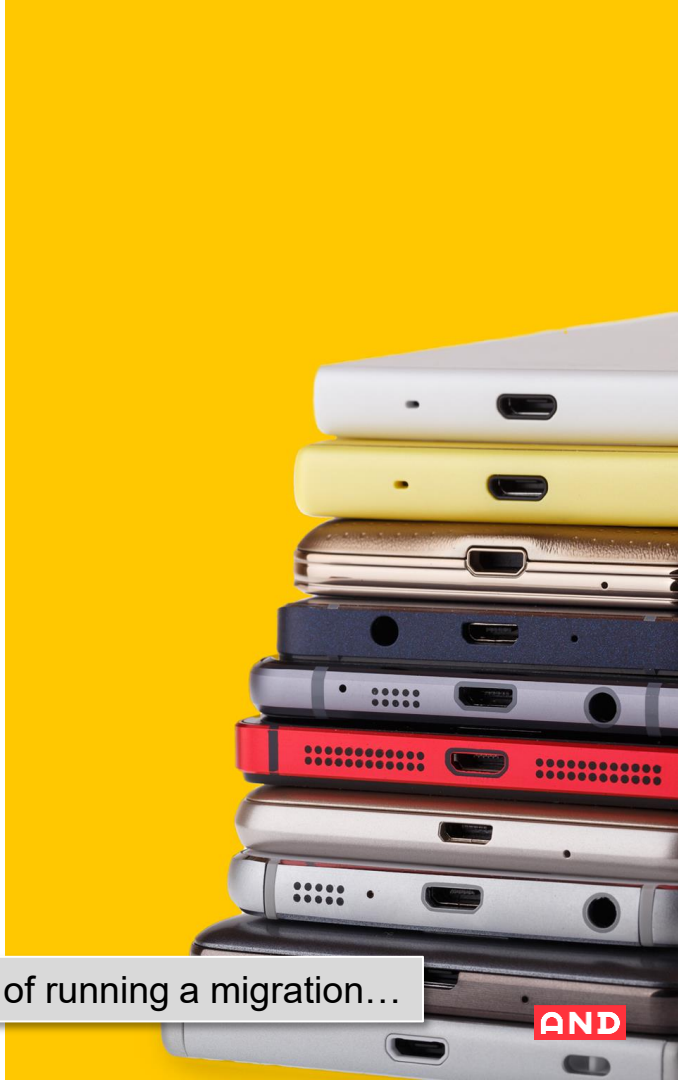


2 Cloud Migration & Migration Strategies

First, what is Cloud Migration?

Cloud Migration is all about moving all or parts of your *data*, *infrastructure* or *compute* services to a Cloud Provider…

Migration Type	Overview of the "6-Rs"…
Rehost (Lift'n'shift)	• Which is where you virtualise & move services "as is" to Cloud resources. Usually used for propriety application services like web applications or on-premise applications
Re-platform	• Which is where you move on-prem services "as is" to the Cloud using Cloud Native alternatives – e.g. Cloud managed databases • It can also include moving to PaaS services
Repurchase	• Which is where you move services (where available) to a SaaS offering – like Office365 for email, documents etc.
Refactor	• Which is where you partially or fully redesign your service architecture to make best use of Cloud Native services, e.g. microservices
Retain	• Which is where you keep some services – usually Legacy or highly custom backends – where they are
Retire	• Which is where you replace existing services with Cloud Native ones as previous services can be



…Next, let's look at ways of running a migration…

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Typical Cloud Migration Project Methodology…

This is a typical Cloud Migration approach…

Discovery

- Scope Migration
- Business Due Diligence
- Technical Due Diligence
- Asset & CMDB Discovery

Assessment

- Business Assessment
- Technical Assessment & PoC(s)
- Migration backlog & MVP
- Migration Planning & Approval

Migration

- Technical Migration
- Organisation Migration (Processes & Structures)
- Stabilisation
- Prep handover to SRE/Ops

Run State

- SRE/DevOps team(s) Manage as appropriate

…Discovery is used to define the business & technical case/scope, plus assets to migrate…

…Assessment is used to plan the migration & see potential methods of doing it…

…Migration is used to run the planned migration steps - both technical & organisational…

…Designated run team maintain going forward…

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What services & features *might* typically get migrated?

When you do a migration what do you typically migrate or setup? The following is a sample of the common ones…

- DATA – Static, SQL & NoSQL, File-stores
- SECURITY – WAFs, Security groups, isolation, peering, secrets, keys, certificates, monitoring etc.
- NETWORK – Topology, VNETS, Subnets, LB4/7, Firewalls, VPNs, Routers, Connectivity etc.
- BUDGET – Controls & Monitoring
- COMPUTE – Applications & Servers
- OBSERVABILITY & SRE – Monitoring, Logging, Tracing, Alerts, Incident Management, Patching etc.
- DEVOPS – Build, Test & Deployment proceses
- IAM – Users, Roles, Groups, Privileges, AD/LDAP etc.
- PROJECTS & BU – Organisational structures
- CONTROL – Management & Oversight

…We will look at ***some*** of these in more detail next…

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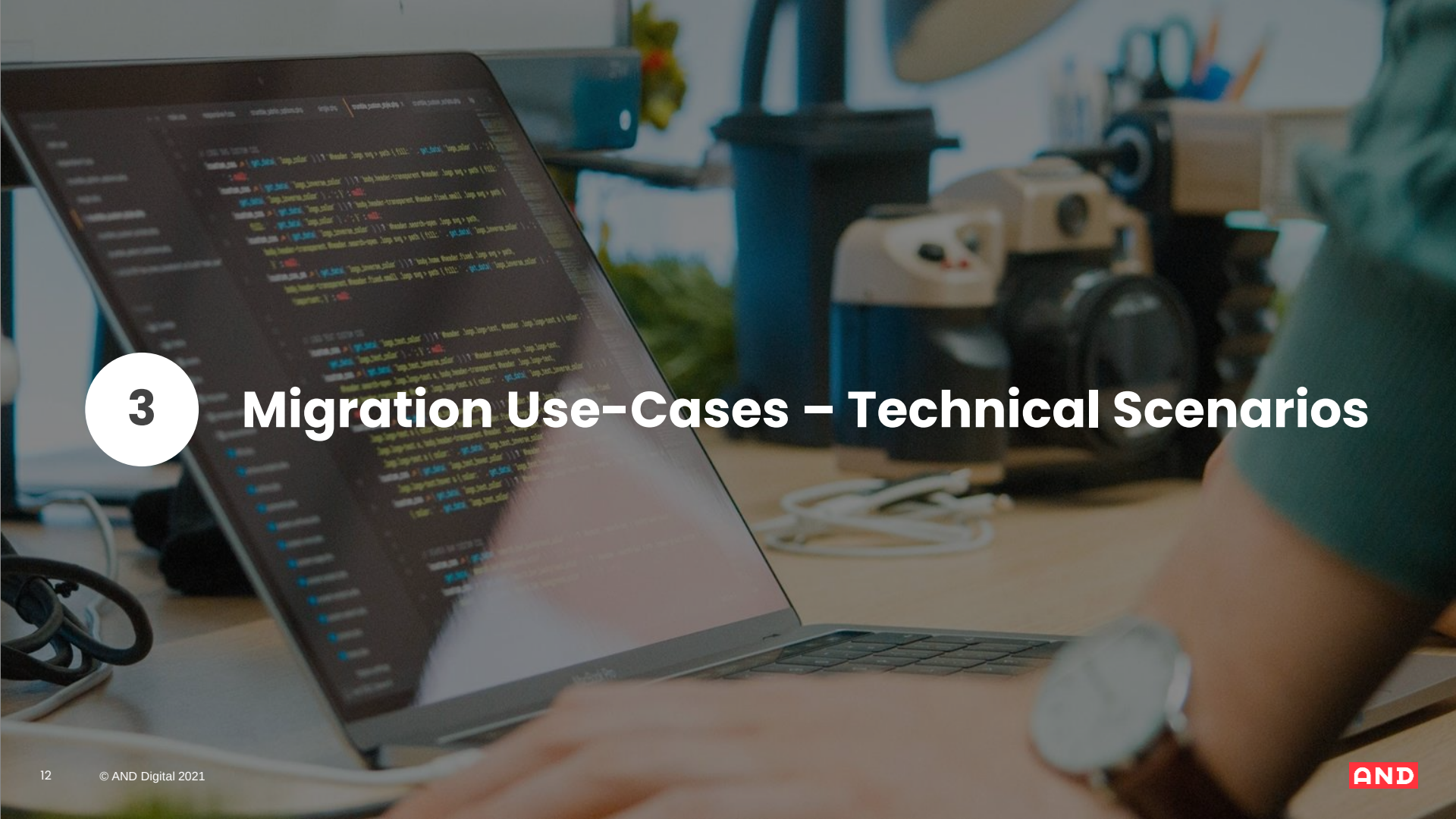

3 Migration Use-Cases – Technical Scenarios

Which Use-cases are we doing?

In this section we are looking at scenarios for migrating...

DATA – Static, File & Databases

NETWORK INFRASTRUCTURE

COMPUTE RESOURCES & APPLICATIONS

Data Migration

Firstly, let's look at some of the options for Data Migration...

Static Data	File Data	(No)SQL Data
• BLOB & Static data • Migrate using online transfer – UPLOAD, RSYNCH methods • Offline methods like transfer appliances or archival media • Depends on size	• Files & Directory data • Migrate using online transfer – SMB, UPLOAD, RSYNCH • Offline methods like transfer appliances or archival media • Depends on size	• Database data • Export & Import • Instance "synch'ing" • ETL methods • Migration utilities • Database file transfer • Virtualisation lift'n'shift

MIGRATION TO CLOUD

“Network” & Topology Migration

Network migration is usually the most manually intensive as it requires mapping physical infrastructure & topology to Cloud Provider specific IaaS.

A typical approach might be…

Review existing topology & relevant architecture

Map topology to Cloud Provider IaaS services

Define Environmental Profiles

Codify & test profiles using IaC

Modularise IaC

Self-Service Catalogue for Cloud Deployment

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Compute Service Migration

Compute migration is dealing with migrating application servers, applications & server clusters to the Cloud. It is not just migrating infrastructure, but can also be about refactoring service architectures for Cloud as well. Common approaches are...

Rehost

- Rehosting Servers
  - Lift'n'shift approach used to mirror existing servers "as-is" to the Cloud
- Virtualise your on-premise host & upload image to the Cloud
- Create instances OR instance groups from those Cloud image(s) for use
- Can also use on-prem migration utilities from some Cloud Providers to guide the process
- Easiest to do, but does not take full advance of Cloud architecture

Re-platform

- Re-platform Services
  - Migrate services to similar Cloud Native technologies
- Application services – like Web Servers, WebAPIs, REST, applications can be...
  - "Dockerised" & hosted on container engines (like Kubernetes)
  - Deployed directly onto Cloud managed application sandboxes like EBS, or AppEngine
- Application binary is not refactored. It is just deployed "as-is" to a Cloud Managed service

Refactor

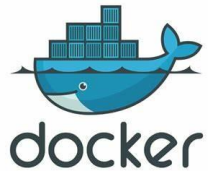
- Refactor Services
  - Refactoring is about refactoring your application architecture to best fit available Cloud services
- This is highly dependent on your architecture, but would most likely include things like...
  - Decomposition of application logic into appropriate Microservices or Macroservices
  - Dockerise & Deploy to container services like Kubernetes
  - Using native messaging & event services to provide inter-service communication

What is Docker & Kubernetes?

Docker & Kubernetes are two critical technologies you need to be aware of to really benefit from migrating your applications to the Cloud…

Containerisation & Docker

- Containerisation is the process of building a very light-weight, self-contained image that has all the OS, middle-ware & deployed application binaries dependencies baked in
- Images once built can be deployed on any Docker supporting OS (which most do) & run “as-is”
- Unlike VMware type images, they are very small & scale very easily on any OS
- They are key to many Cloud Native technologies, but are totally portable to any of them



Kubernetes

- Kubernetes is a “container orchestrator” platform which is an “all in one” technology for managing the deployment, monitoring, scaling, security, load-balancing, health & inter-service communication of any containers deployed to it
- It is one of the most common defacto standards for making proper use of Cloud benefits – like scalability, managed services & cost

…Next, onto business impacts…

kubernetes AND

4 Business Impacts

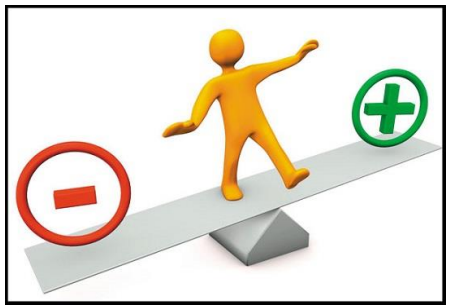
What are the positive verses negative impacts?

Like any organisational change, there are potential impacts that need to be considered e.g....

Positive Impacts
• **Cheaper Costs** – You only pay for what you use (metered service) • **Managed Services** - Patching, upgrades, availability etc. of services are managed for you • **Elasticity** - Services can scale automatically based on demand • **SRE** - Supporting technologies like monitoring, tracing, DRaaS etc. are provided for you & can be more closely integrated out of the box • **Control** - You can choose the level of control that you want using IaaS & PaaS • **Empowerment** - Teams can now potentially own their services all the way into production

Negative Impacts
• **Reskilling** - Organisational reskilling is required for Ops, Runtime & Dev functions • **Control** - There is some loss of control over environments • **Processes** - Business practices & structures MAY have to change or adapt to better support Cloud (DevOps & Ops/SRE) • **Refactoring** - Applications & services may need to be refactored to make better use of “modern” architectural patterns • **SRE** - Existing solutions for monitoring & recovery may need to be replaced as well – increasing cost • **Downtime** - Downtime for migration might be an issue

“…One person’s positive is another person’s negative…”



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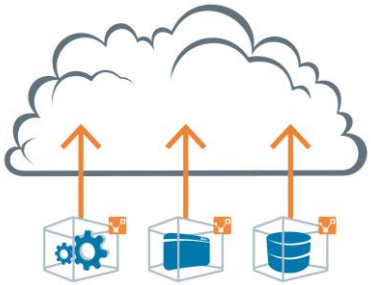
How can you potentially mitigate these impacts?

Business

- Do your migration incrementally
  - Scope & control your migration, you do not need to do it all at once
- Brownfield vrs. Greenfield
  - For Brownfield projects use rehost, re-platform or hybrid cloud to start with. Do not try to refactor everything at the beginning
  - Greenfield projects should be designed with Cloud in mind
- Staff & Teams
  - Retrain existing staff in Cloud technology or augment them with new hires
  - For Ops functions - keep structures the same or move them into project teams
- Budgeting Control & Funding models
  - Do you use a *centrally funded* Ops function approach or *distributed project funding*
  - Review which approach works best for you

Technology

- Service Migration
  - Firstly, start with data services, then compute, then network, but beware of “source of truth” issues & complexity
  - Always implement Security, IAM policies, budget controls & observability inline with the services migrated
  - Have a cohesive end-state in mind, even if only migrating parts into it
- Use Hybrid & Re-platform Solutions where appropriate
- Microservices & Containerisation
  - Cloud technologies work best with containerisation technology
  - New application architectures should be designed with that in mind



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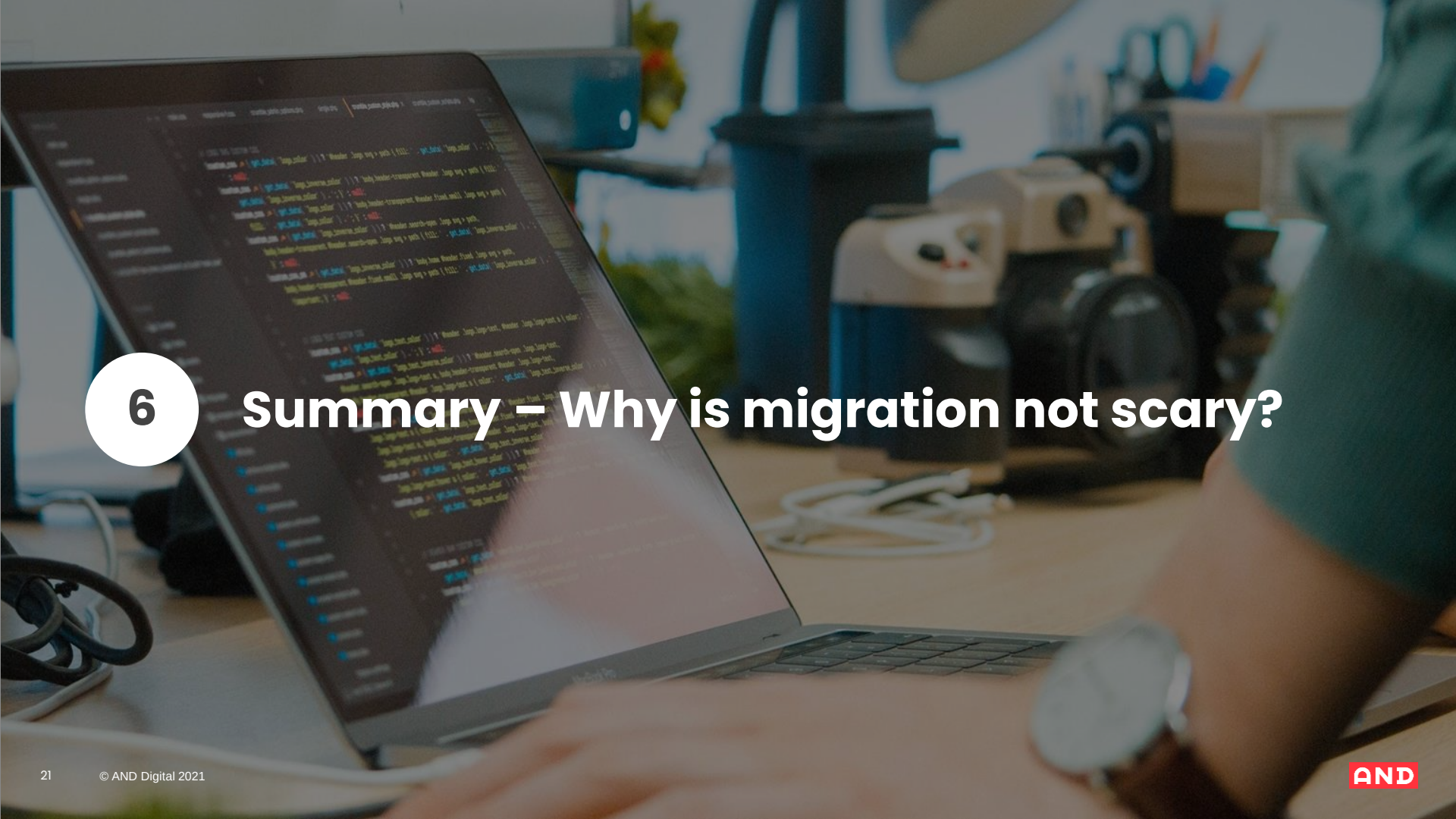
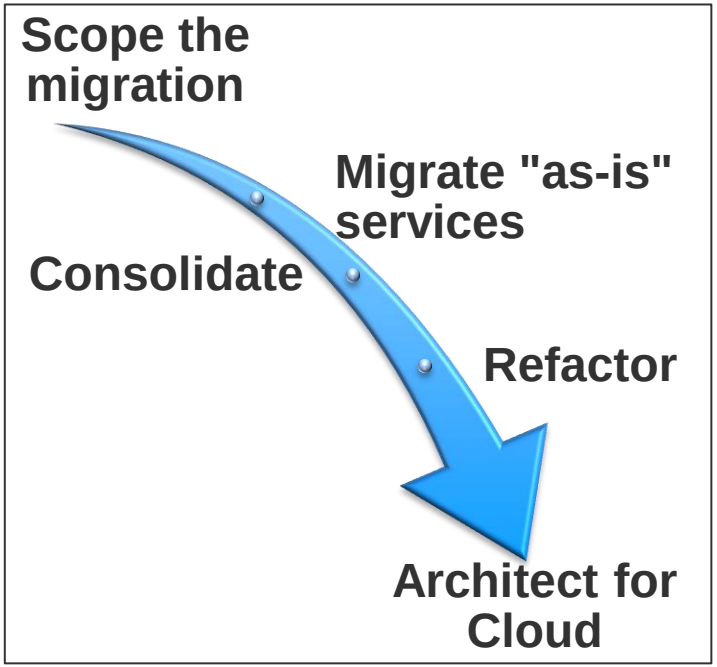


6 Summary – Why is migration not scary?

Key Things to Keep in Mind…

When looking at Cloud Migration it is important to remember the following points & mental maturity model…

- MIGRATIONS CAN BE DONE INCREMENTALLY
- MANY SERVICES CAN BE TRANSFERRED “AS-IS”
- ONLY MIGRATE WHAT MAKES SENSE TO
- HYBRID CLOUD APPROACHES ALLOW “BEST OF BOTH WORLDS”
- REFACTORING OF SERVICES CAN BE DONE GRADUALLY
- MIGRATION TOOLS DO EXIST TO HELP WITH THE PROCESS



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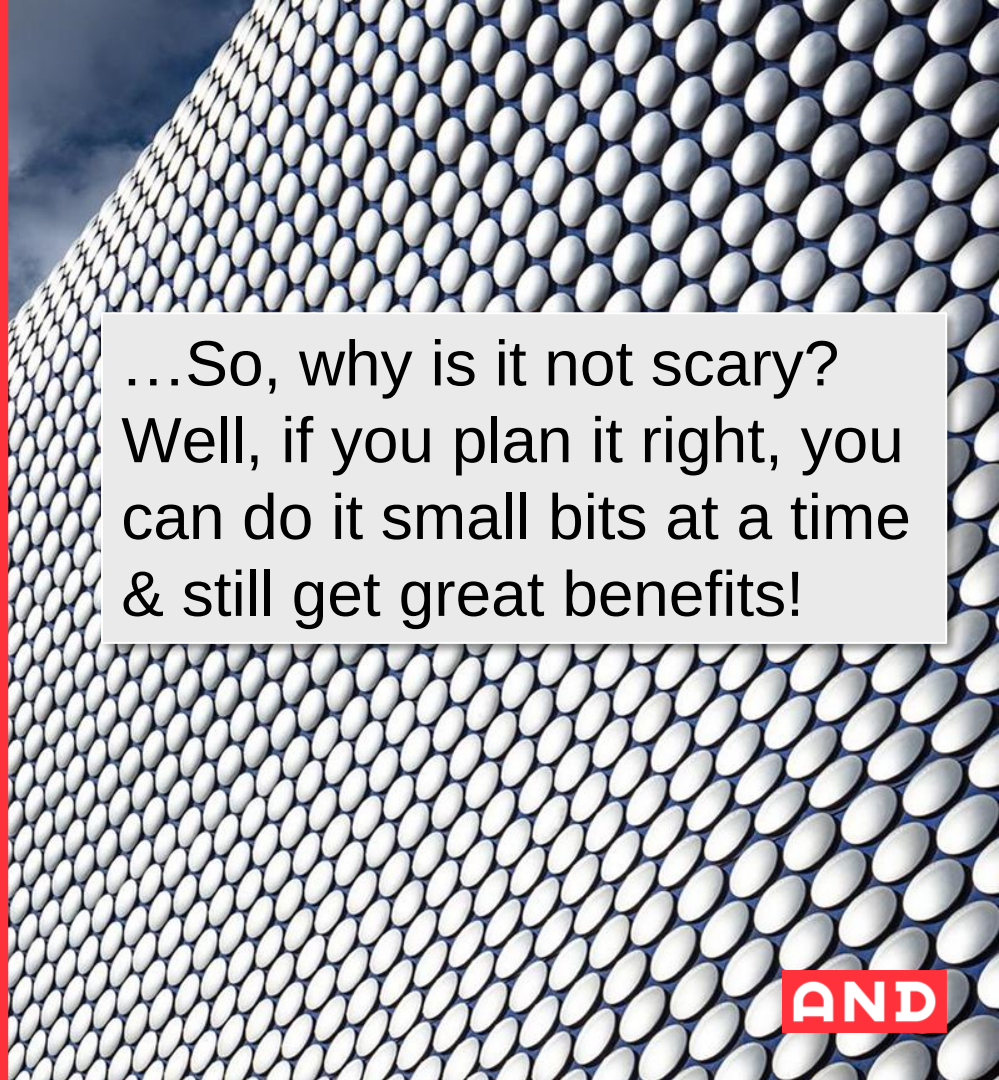
Summary…

- Cloud Services are managed IaaS or PaaS services that are hosted in the Cloud
- Cloud Migration is the movement of data, infrastructure & applications to those Cloud managed services
- Cloud Migration Strategies must include both technical & business objectives
- Do migrations incrementally based on business priorities
- Using “rehost”, “re-platform” or hybrid cloud strategies minimises any work involved
- Refactoring migrated services is needed to best make use of Cloud, but is not essential



Over AND Out