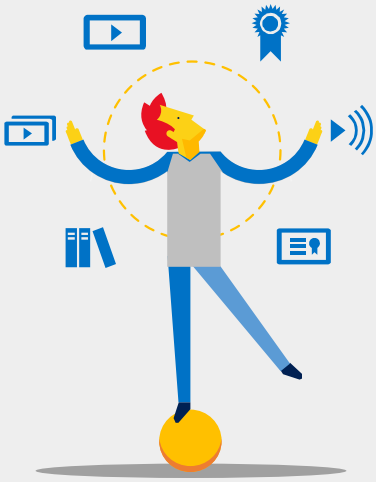
Service Fabric Patterns & Best Practices



Microsoft

Cluster planning & Management

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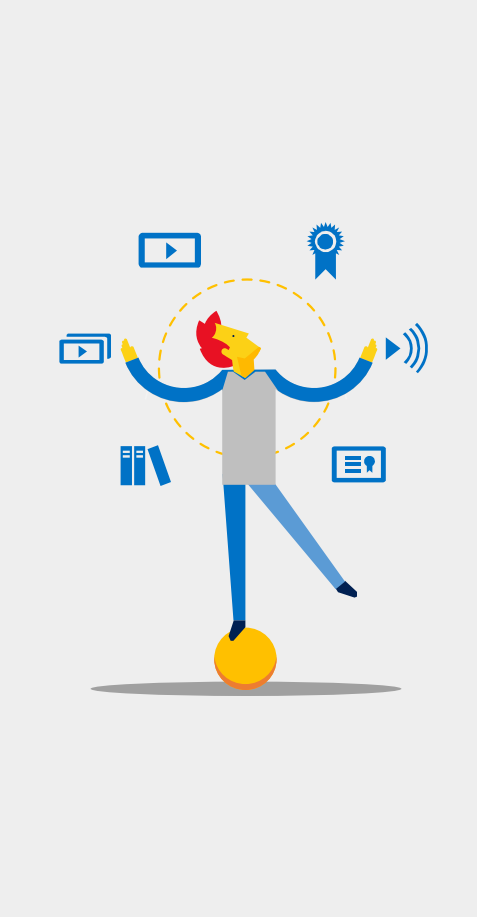


Microsoft

Problem

Cluster Management nightmares

- I always worry about running out of capacity ?
- I am not sure if all the VM resources are utilized ?
- I am worried sick about my cluster being compromised.
- I have no control on when a new Service fabric version is rolled out to my cluster.
- I am not sure if what disasters my cluster can survive ?

Best Practice

Service Fabric Cluster Management nightmare mitigation

Let us divide the problem space into three buckets

1. Plan out your cluster capacity
2. Optimize and Secure your cluster
3. Manage your cluster version

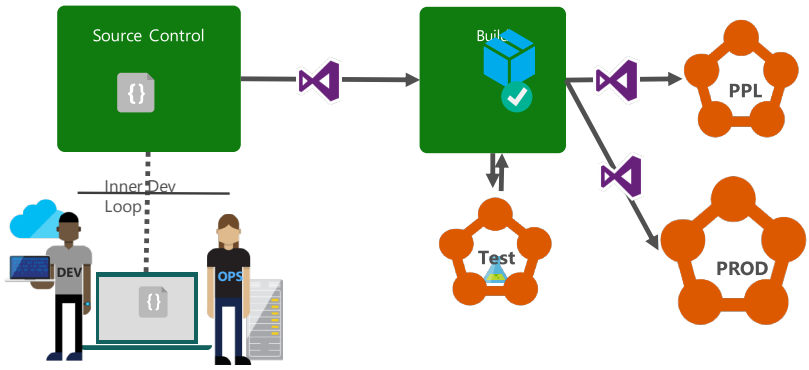
Best Practice

Service Fabric Cluster planning

- Capacity planning is not an easy exercise.
- Capacity planning is not a one time exercise.
- Do not assume that you can add capacity on demand instantly.
- Do not assume that you can take downtime to change capacity later

- Here are some of the questions you will need answer for, before you can truly plan out your cluster.

Service Fabric Cluster planning



- What is this cluster to be used for ?
  - Is this to be used for Test ?
  - Is this a part of the CICD pipeline ?
  - Is this for Production use ?

- Where do you want this cluster hosted ?
  - On Azure ?
  - On-Premise, in your data center ?
  - On some other cloud provide ?

- Are there unique compliance and security requirements?
  - End-to-end RBAC and Auditing ? Certificates OK ? Active Directory OK ?
  - Compliance expectations from the infrastructure ?
  - Compliance goals on the application ?

Service Fabric Cluster planning

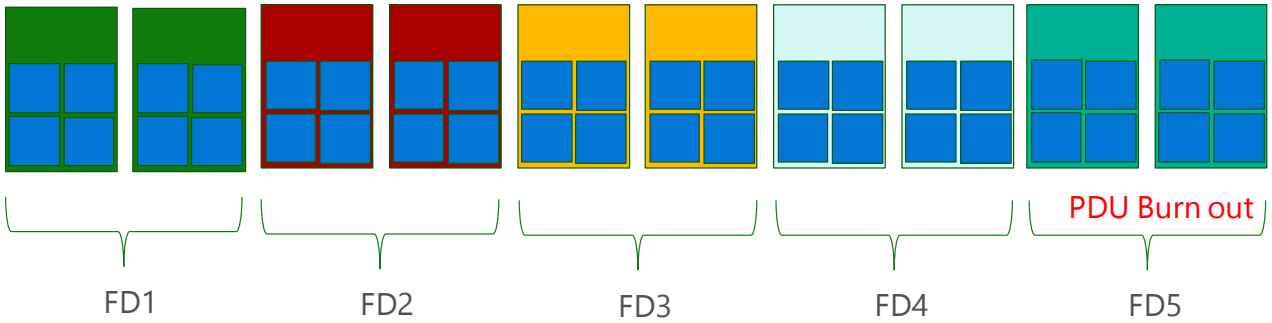
- What kinds of workloads are planned to be deployed to it ?
  - For each Application
    - Total State
    - # of instances
    - Replica set size
    - Port requirements per service
    - IOPS needed
    - External state vs State in the Service Fabric Clusters.
    - Growth rate
  - How many Node types (what kinds of apps are to be deployed)
    - Are their non-SF services to be run as well ?

Service Fabric Cluster planning

- Once you know what each Application needs, focus on Characteristics of each nodetype.
  - CPU
  - RAM
  - Disk (total state of the replicas you want to host)
  - State durability (Gold vs Silver)
  - Reliability (applies only to primary node type).
  - Fault tolerance - # of FD and # of UD
- Choosing the # of FDs
  - This determines the headroom needed in case of unplanned failures.
- Choosing the # of UDs
  - This determines the headroom needed in case of planned failures.

Choosing the # of Fault Domains you need

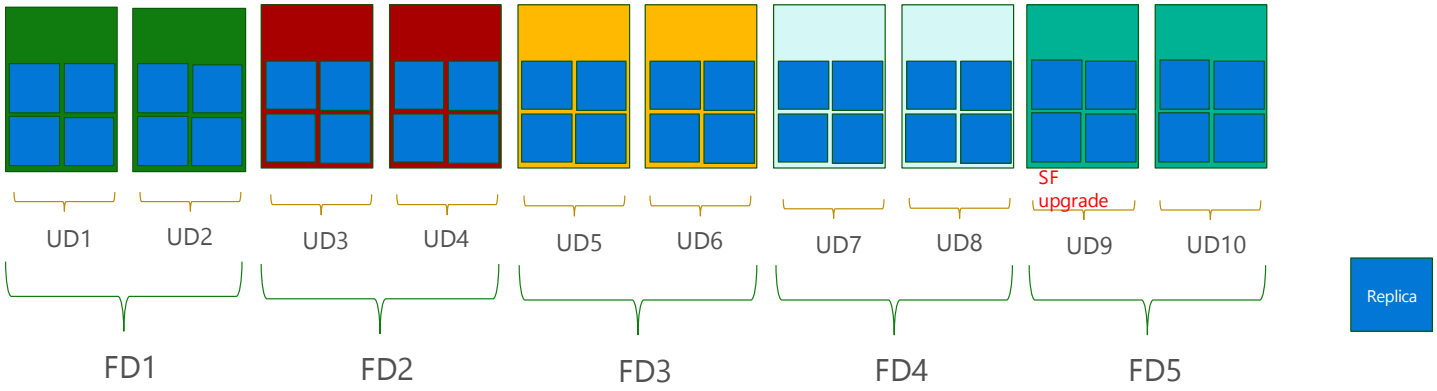
- Number of Fault Domains determines the headroom needed in case of unplanned failures.
- Examples could be a PDU failing or TOR maintenance . Which will typically take out all machines in a Rack.



- In terms of capacity – you need to leave enough headroom to accommodate failure of atleast one FD
- This will result in SF moving/creating new replicas on the available Machines in other FDs.

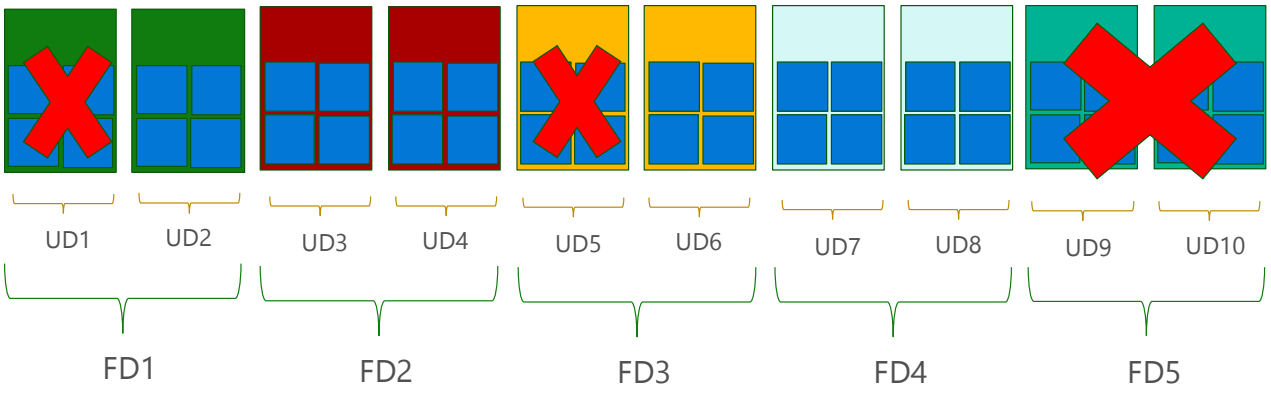
Choosing the # of Upgrade Domains you need

- Number of Upgrade Domains determines the headroom needed in case of planned failures/downtimes.
- Examples could be a service fabric upgrade going on, and a UD is down. You have to have room to place additional replicas if need be.



Best practice – capacity headroom

- You should plan your capacity in such a way that, your service can survive atleast
  - A loss of one FD
  - A UD being down because of an upgrade going on
  - A random node/VM failing additionally.



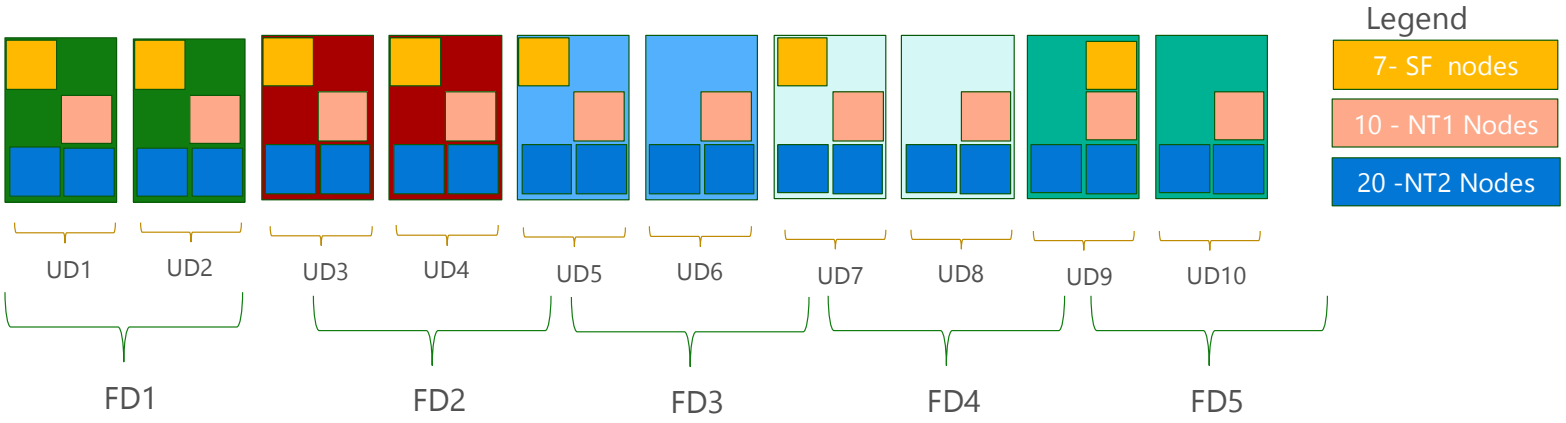
Best practices – Cluster Set up

- Use ARM template to customize your cluster
  - Spread VMs across multiple storage account
    - Fan out the IO
    - Protection against widespread outage

- Use ARM template to drive changes to your Resource Group
  - Easy configuration management
  - Auditing
  - Avoid using implicit commands to tweak your resources.
  - Be very pedantic on the configurations your deploy to your production environment

Best practices – Cluster Set up

- Use a separate node type to host system services for large clusters – for large cluster.



Generate a custom ARM Template and review

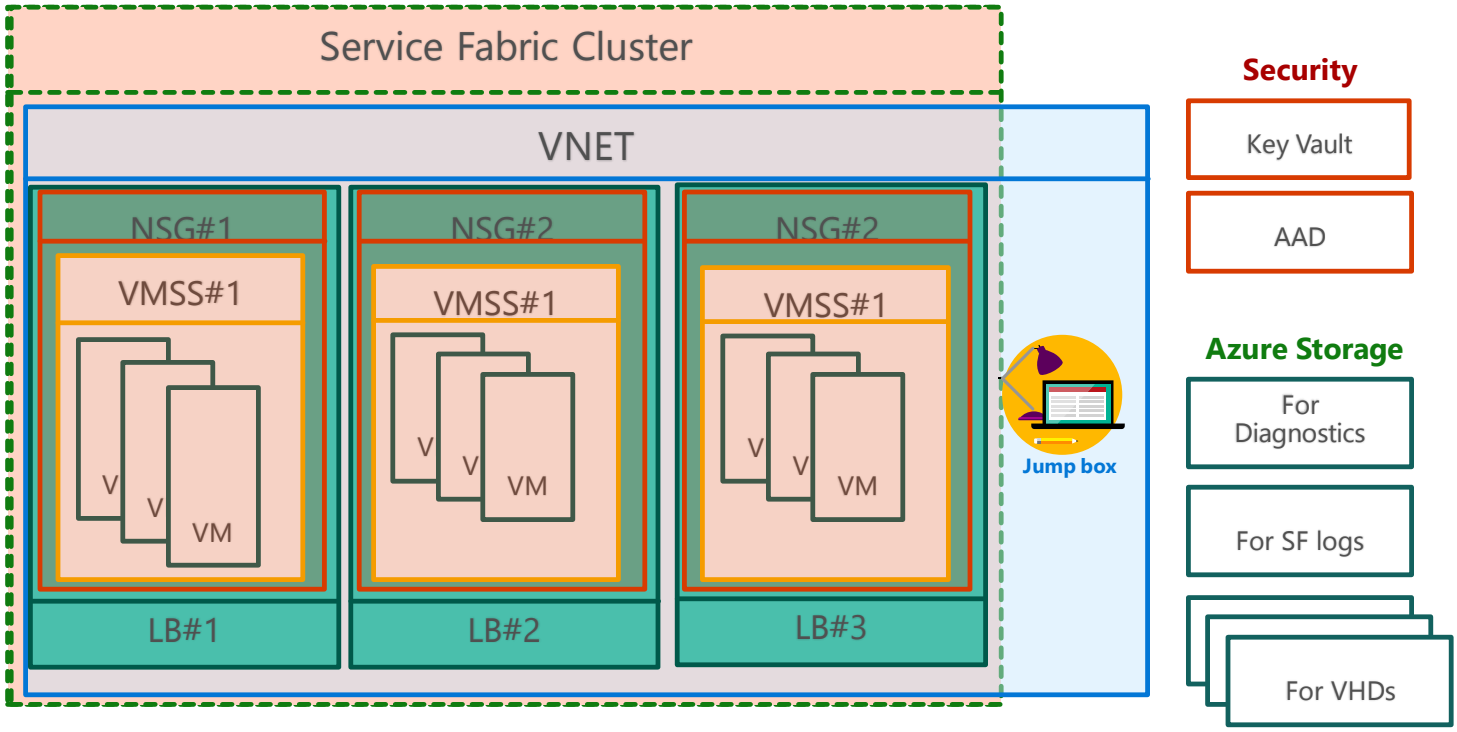
- 10 node , 2 nodetype windows
- Use the portal to start with

Demo#1

Best practices – Cluster Security

- Always use a secure cluster to deploy anything you care about
- Additionally consider the following
  - Create DMZs using NSGs
  - Use Jump boxes to manage your cluster

Best practices – Cluster Security



NSG ports that needs to be opened

- ClientConnectionEndpoint (TCP): 19000
- HttpGatewayEndpoint (HTTP/TCP): 19080
- SMB – 445 and 135
- ClusterConnectionEndpointPort (TCP): 9025
- LeaseDriverEndpointPort (TCP): 9026,
- Ephemeral Port range – min 256 ports
- App ports –as needed.

ARM Template review

- 15 node , 3 nodetype , 1 Jump box
- with NSG
- with a Jump box

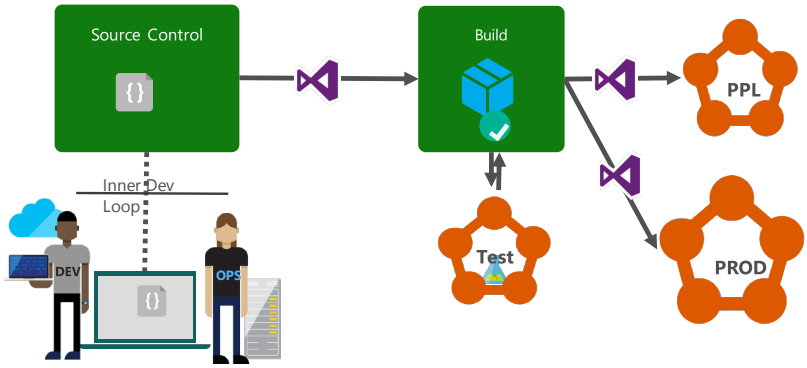
Demo#2

Manage you Cluster Version

- Ability to select a supported Fabric version
  - Set the upgrade mode to – Automatic or Manual
  - Select the specific fabric version Via APIs or Portal
- You can switch between Automatic and Manual
- You have 60 days to adopt the new version
- A warning is generated 14 days prior to your cluster going out of support
- New versions are announced on the team blog

- For more details visit this Manage your cluster version page

Cluster Fabric Upgrade



- Factors to consider when choosing the upgrademode
  - Availability of your service
  - Need for predictability of performance
  - Freedom of choice to select the velocity
  - Support considerations
  - Recommendation of upgrade mode for – for dev, test, PPL, prod

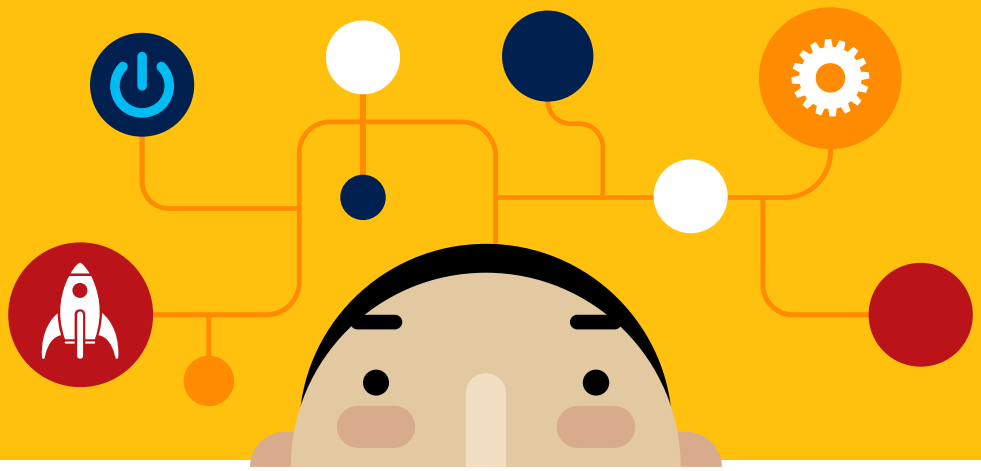
Additional topics to consider

- Cluster monitoring and diagnostics
  - Coming up in the next session with Todd and Haishi.
- Disaster Recovery Planning

DR planning

- **Stateless apps**
  - VIP swaps
- **Stateful apps**
  - Active – Active/Passive configurations
    - RPO – 15 mins
  - Backup and restore
  - Using xstore
  - Copy state from Cluster A to Cluster B using custom code.
  - …

Thankyou



Links to the documents

Capacity planning

Relationship between Nodetypes and VMSS

Cluster security

Upgrade your Cluster – Azure
Upgrade your Cluster – On premise

Scale your cluster in or out – Azure
Scale your cluster in or out – On Premise

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