Capacity Planning

Key Considerations

Google Cloud

Agenda

- Capacity planning considerations and focus
- Capacity Planning calculations

Capacity Planning Considerations & Focus

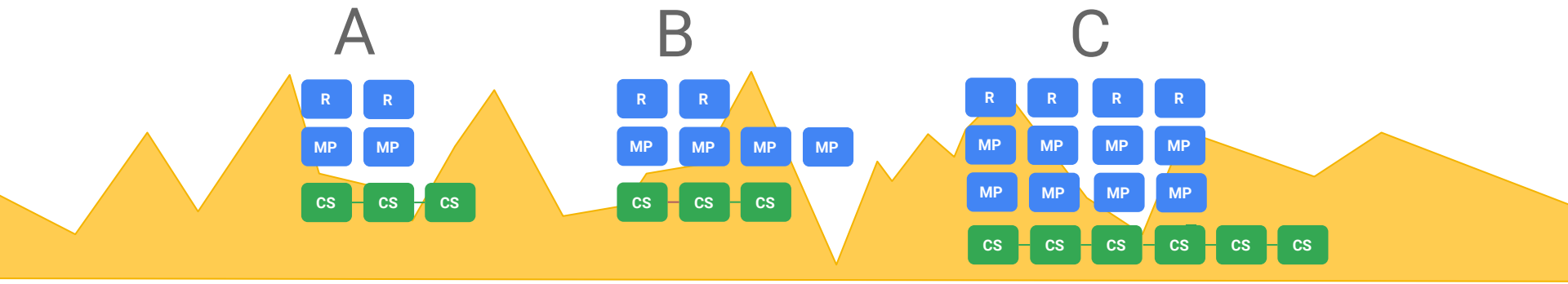
Google Cloud

Considerations and focus

1. Know your business

2. Understand traffic patterns and they affect scaling

- A R is capable to serve traffic to multiple MPs.
- As the number of MPs grows, the number of R and CS nodes may need to increase to keep up with MPs reads/writes.

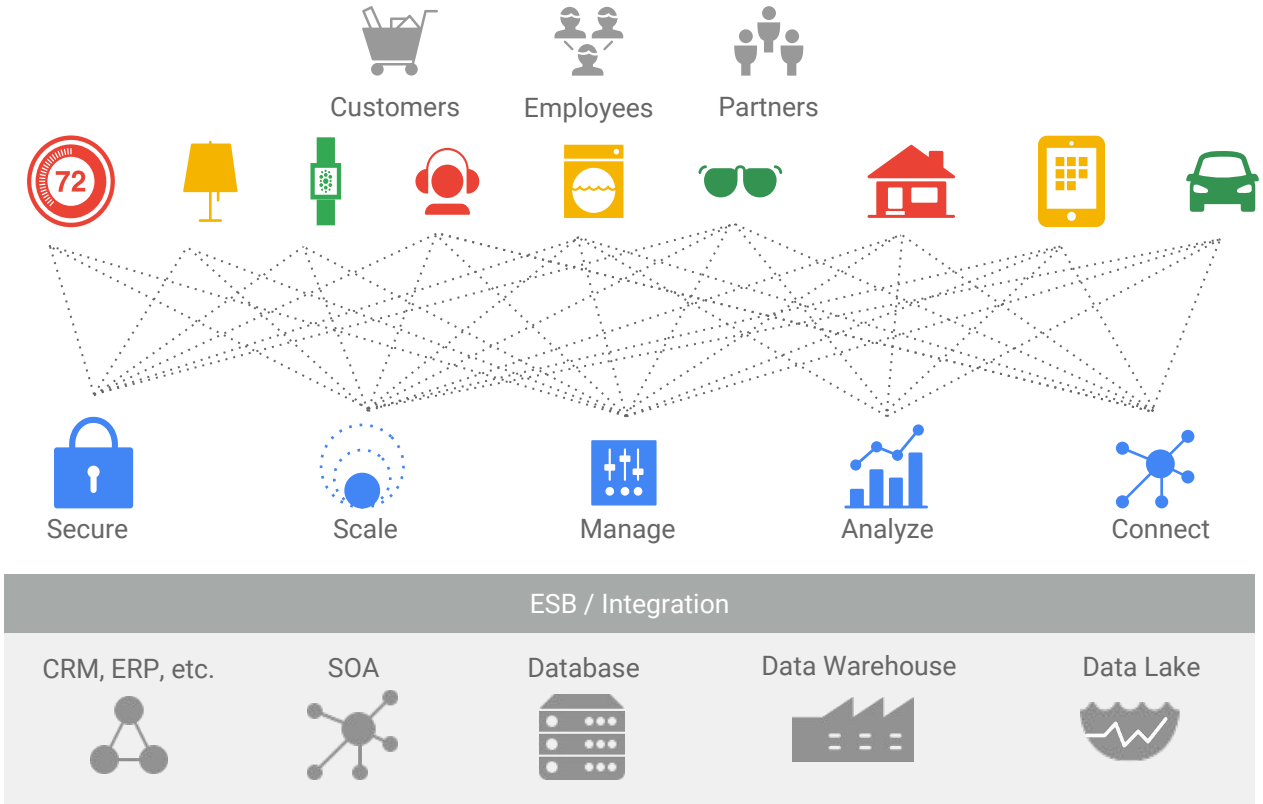


Considerations and focus

3. Plan for X

- Plan ahead.
- Adopt Cloud.
- Take advantage of elasticity if available.
- Understand business strategy, market growth and your company expectations/targets.
- In the case of traditional infrastructure, investing up-front saves more time and money than reacting to accelerated change.

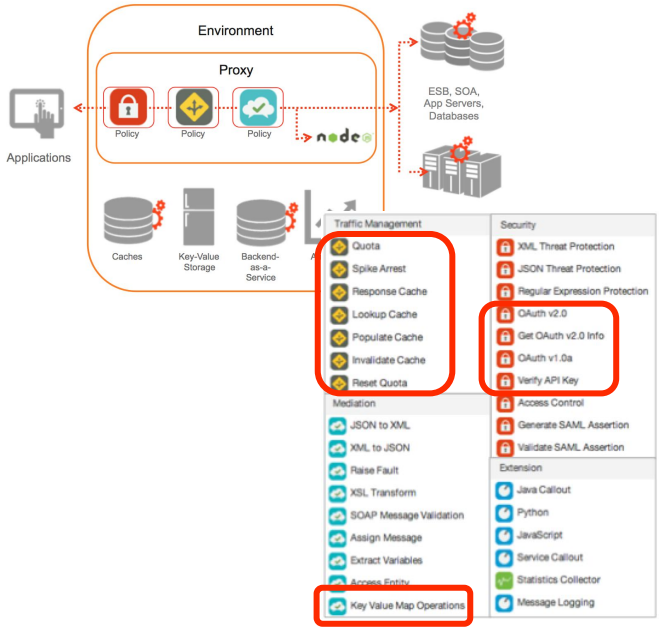
2X, 5X, 10X?



Considerations and focus

Know your proxies!

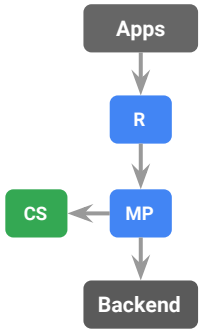
- Depending on the complexity of the bundles, estimated capacity may be reduced.
- Number and type of policies applied will drive API execution time on the gateway.
- Policies that requires reads/writes to Cassandra will increase latency.
- Heavy transformation, SSL termination and other CPU intensive operation will add to processing time.
- Execution time and I/O waiting time impacts the ability of a R+MP to execute concurrent calls.



Considerations and focus

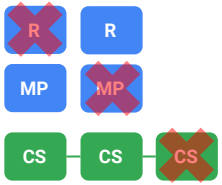
5. Know the critical path

- R, MP and CS (for some policies) stand on the critical path.



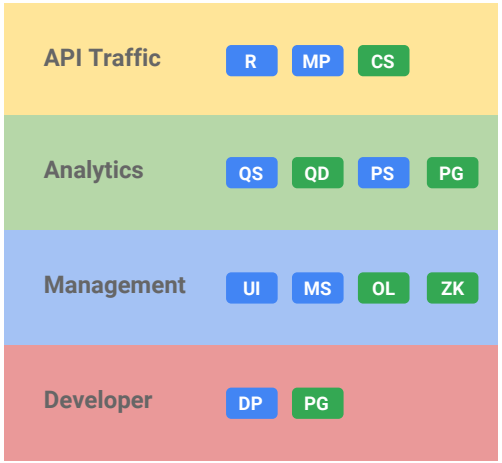
6. Remember everything fails

- Embrace failure.
- Consider what will happen to capacity when things go wrong.



7. API Traffic, Analytics, Management and DevPortal components can and should scale independently

- Focus investment, resources and processes.



Considerations and focus

8. Hardware characteristics and requirements

Server/VM	Components	CPU	RAM	Hard Disk
Message Processor	R, MP	4/8 Core	8/16 GB	100 GB
Cassandra	CS, ZK	8 Core	16 GB	250GB local storage with SSD or fast HDD supporting 2000 IOPS
Analytics	QD, QIS	4 Core	8 GB	20GB - 500GB local storage with SSD or fast HDD
Management	UI, MS, OL	2 Core	4 GB	60 GB
Postgres	PG, PS	8 Core	16 GB	500GB - 1TB** network storage***, preferably with SSD backend, supporting 1000 IOPS or higher*
Developer Portal	DP	2 Core	1 GB	10 GB

- A Message Processor (MP) is capable of handling ~1000 TPS.
- For best performance, SSDs are recommended for Cassandra. SSDs provide best performance both due to the nature of the hard disk technology and access patterns used by Cassandra.
- Cassandra compaction and hits file processes must be considered when estimating hard disk capacity.
- Edge custom reports capabilities execute queries again raw data tables. Fast IO disk are recommended for best performance.

Capacity Planning

Google Cloud

Cassandra capacity planning

Calculating usable disk capacity per node
When estimating usable disk space, it is important to consider not only the estimated data volume based on API traffic, usage of Edge policies that makes use of Cassandra (such as Oauth, Cache, KVM, etc) but also consider the operational process that are automatically executed by Cassandra behind the scenes.

Below is described how to calculate usable disk space per node/server

```
raw_capacity = disk_size * number_of_data_disks
formatted_disk_space = (raw_capacity * 0.9)
usable_disk_space = formatted_disk_space * (0.5 to 0.8)
```

Where 0.5 to 0.8 is defined by the space needed for compaction, hint files handing, snapshots, etc. For instance, if you are expecting to store 100GB data in a single Cassandra node, you will need around 250GB disk as per the formula above. 120GB or so of the original raw space will be allocated to disk format space + Cassandra operational processes (compaction, hint files, etc). The remaining, will be the usable disk space that could be allocated to data.

Calculating usable disk capacity per on the ring
In addition to the disk space needed for Cassandra operational processes, when calculating the usable disk space on the "ring", replication factor should be considered. Edge uses replication factor of 3, this ensures high availability, resiliency and performance.
Replication factor of 3, means, the data "single data element" will be copied 3 times on the ring, one time per node. On a 3 node Cassandra ring, this means the data is the same in all nodes so, if each node has 500GB of usable storage, that doesn't translate to 1500GB, it remains as 500GB on the ring since data is copied one time per node. As the number of nodes goes beyond the replication factor, additional free space may be gained.

PostgreSQL capacity planning

Adjust PostgreSQL system requirements based on throughput:

- Less than 250 TPS: 8GB, 4-core can be considered with managed network storage*** supporting 1000 IOPS or higher
- Greater than 250 TPS: 16GB, 8-core, managed network storage*** supporting 1000 IOPS or higher
- Greater than 1000 TPS: 16GB, 8-core, managed network storage*** supporting 2000 IOPS or higher
- Greater than 2000 TPS: 32GB, 16-core, managed network storage*** supporting 2000 IOPS or higher
- Greater than 4000 TPS: 64GB, 32-core, managed network storage*** supporting 4000 IOPS or higher

The Postgres hard disk value is based on the out of the box analytics captured by Edge. If you add custom values to the analytics data, then these values should be increased accordingly. Use the following formula to estimate the required storage:

```
(# bytes/request) * (requests per second) * (seconds per hour) * (hours of peak usage per day) * (days per month) * (months of data retention) = bytes of storage needed
```

*** Network Storage is recommended for Postgresql database because:

- It gives the ability to dynamically scale up the storage size if and when required.
- Network IOPS can be adjusted on the fly in most of today's environment/Storage/Network subsystems.
- Storage level snapshots can be enabled as part of backup and recovery solutions.

Thank You

Google Cloud