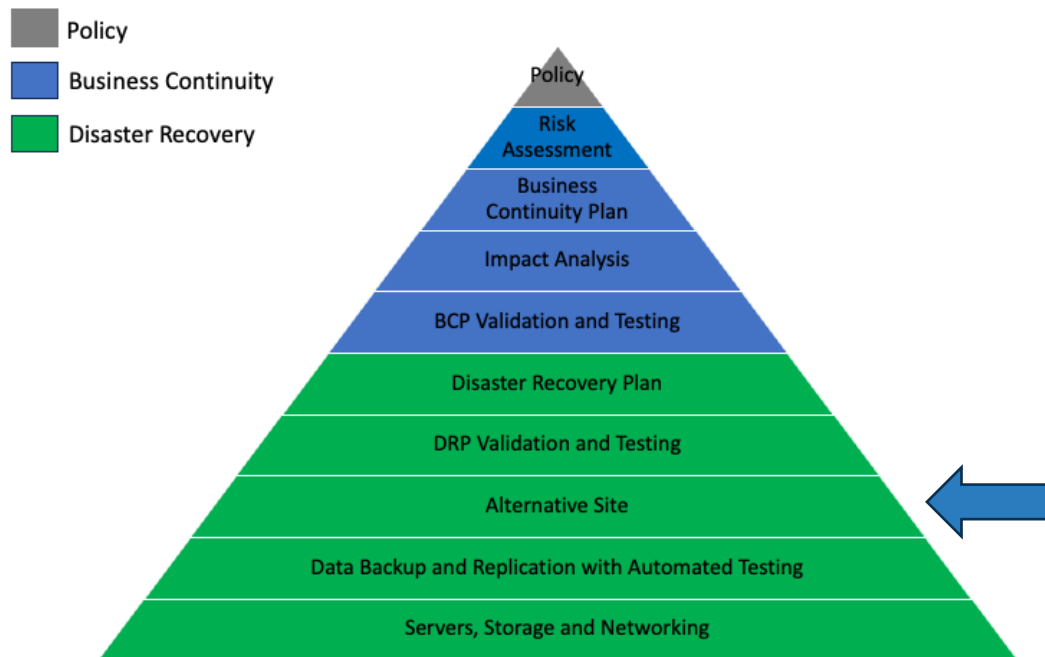


Integration of Oracle Cloud Resources into CERN IT BC&DR

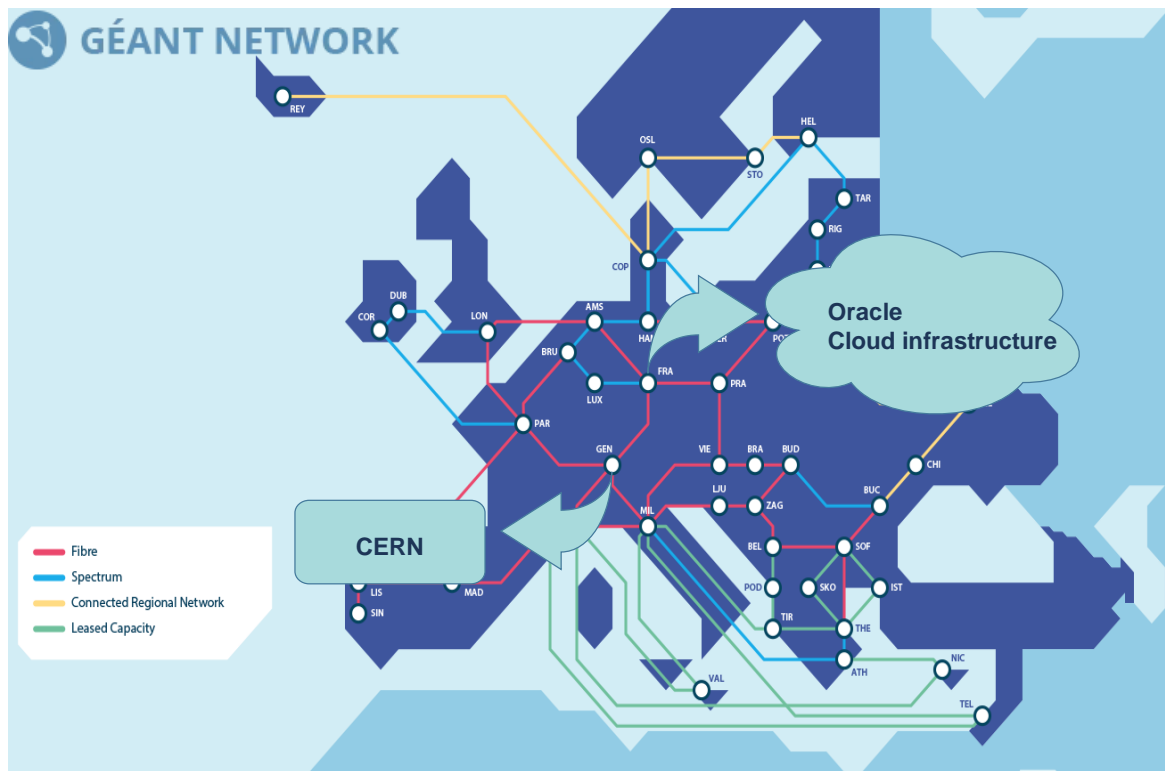


Miroslav Potocky, CERN IT Database Services

CERN BC & DR Framework



External prerequisites



- CERN – GÉANT
 - 2 x 100Gbps
- GÉANT – OCI
 - 2 x 10Gbps

Resources mapping

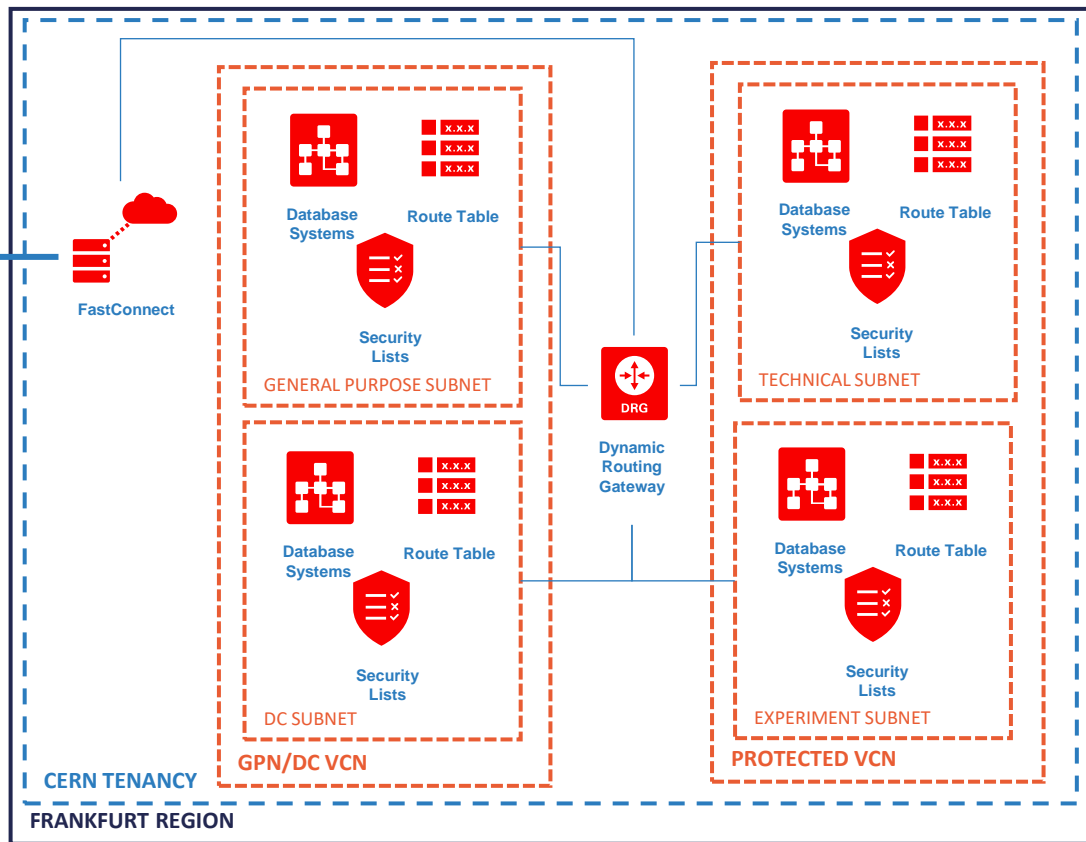
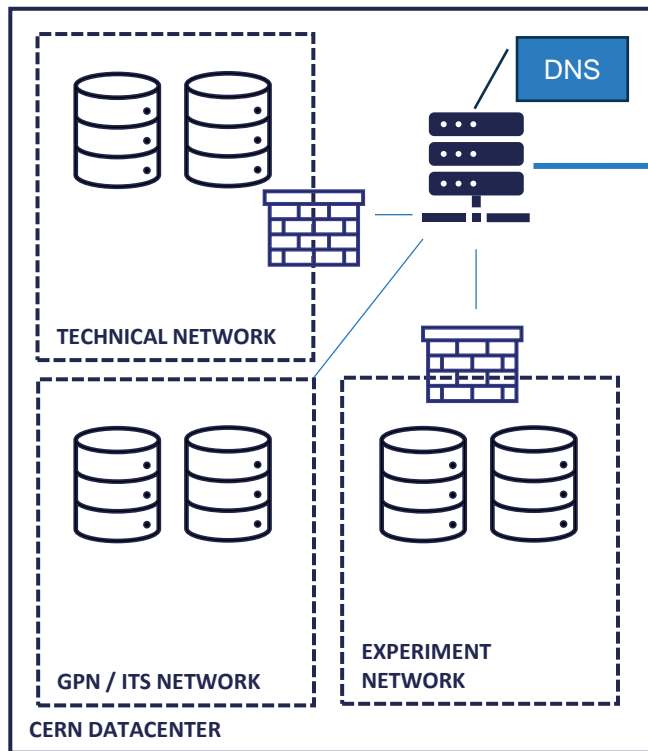
CERN DC

- External router
- OpenStack Ironic Host
- IP Services / Networks
- Subnet
- Router
- Firewall
- Oracle Database

Oracle Cloud Infrastructure

- FastConnect + DRG
- Oracle Base Database Node
- Virtual Cloud Network
- Subnet
- Routing table
- Security list
- Oracle Database

Tenancy Setup



Setup challenges

• Repeatability

- Several complete tear-downs and rebuilds
- Automation of API calls
- No API for on-premise counterpart

• Completeness

- On-premise landscape evolution
- Requirement to “catch and incorporate” changes

• Verification

- Database level connectivity
- Limited application vertical test

Repeatability

- OCI CLI

- Essential for
- Basically, a n
- Quick access

```
> oci db system list --compartment-id ocid1.compartment.oc1..aaaaaaaa72wzmexpujop3xxhz77bczh2i2gkypjhtavlhcv32two2v2nua
{
  "data": [
    {
      "availability-domain": "BKR1:EU-FRANKFURT-1-AD-1",
      "backup-network-nsg-ids": null,
      "backup-subnet-id": null,
      "cluster-name": null,
      "compartment-id": "ocid1.compartment.oc1..aaaaaaaa72wzmexpujop3xxhz77bczh2i2gkypjhtavlhcv32two2v2nua",
      "cpu-core-count": 4,
      "data-collection-options": {
        "is-diagnostics-events-enabled": true,
        "is-health-monitoring-enabled": false,
        "is-incident-logs-enabled": true
      },
      "data-storage-percentage": 80,
      "data-storage-size-in-gbs": 256,
      "database-edition": "ENTERPRISE_EDITION_EXTREME_PERFORMANCE",
      "db-system-options": {
        "storage-management": "ASM"
      },
    }
  ],
}
```

- REST API

- Next step in automation

```
send: b'GET /20160918/dbSystems?compartmentId=ocid1.compartment.oc1..aaaaaaaa72wzmexpujop3xxhz77bczh2i2gkypjhtavlhcv32two2v2nua HTTP/1.1\r\n'
```

- Integration with automation software (e.g. Rundeck)

- Manual actions

- Preferably to be avoided

Completeness

- Not a technical challenge

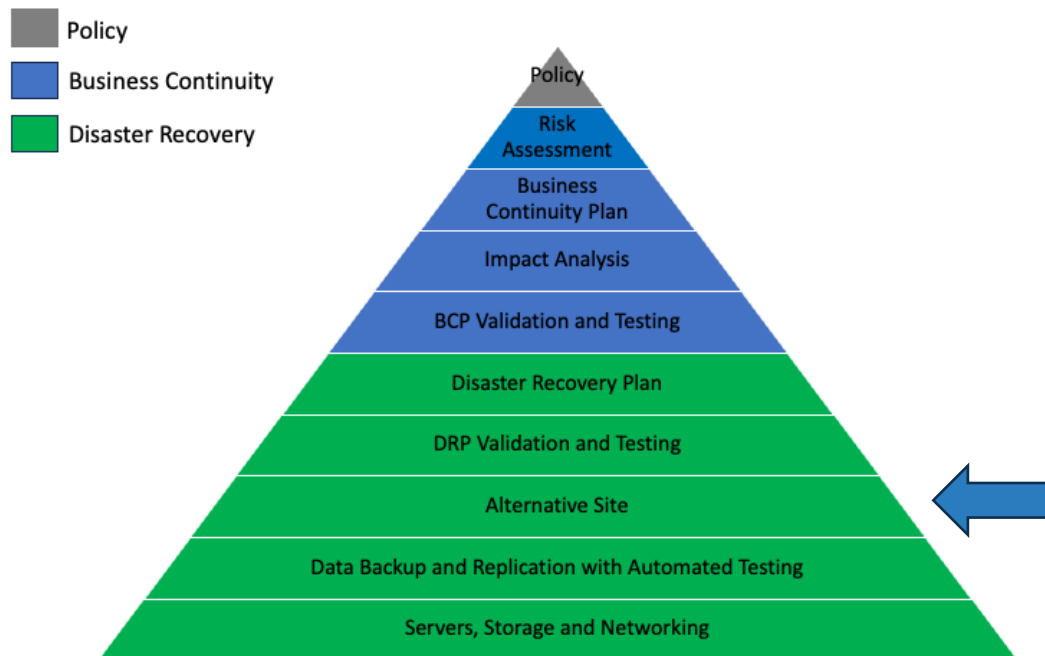
- Policy and housekeeping
- Everyone on-board

- Infrastructure as a code

- Always up-to-date view
- Simple state dump
- Version change control

```
$ cat system_repository.json | \  
> jq '.entities | .[] | \  
select(.sc_entity=="test_entity")' | \  
> jq '{ \  
> db_name: .sc_db_database_name, \  
> db_unique_name: .sc_db_unique_name, \  
> domain: .sc_domain, \  
> project: .sc_project \  
> }' \  
{ \  
  "db_name": "TESTDB", \  
  "db_unique_name": "TESTDB_OCI", \  
  "domain": "GPDB", \  
  "project": "CLOUDDB" \  
}
```

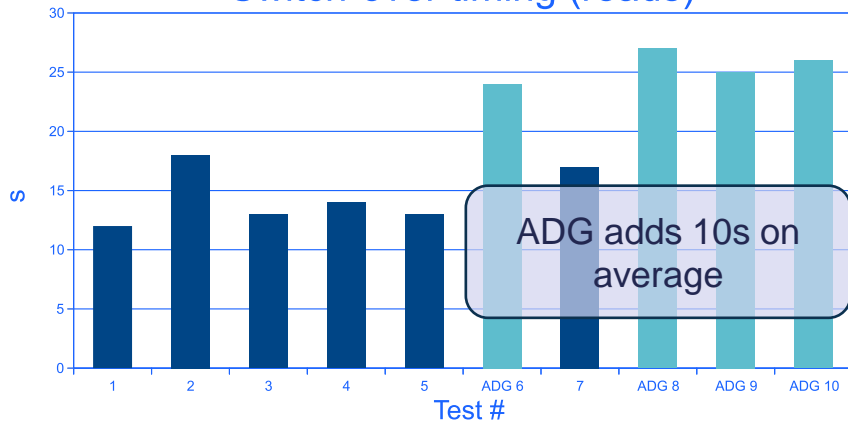

Verification



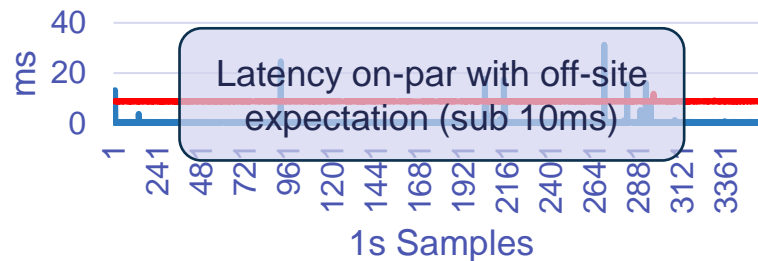
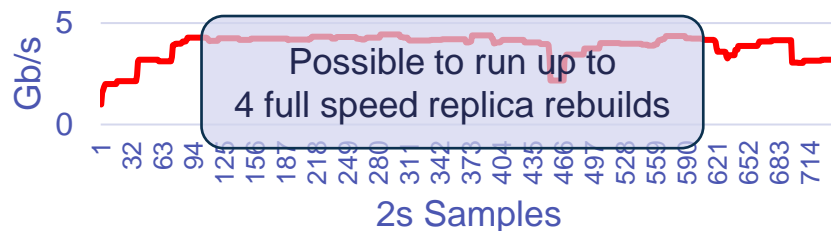
Verification

- Rebuild time
- Response latency
- Switch-over delay

Switch-over timing (reads)



Replication speed (one stream)

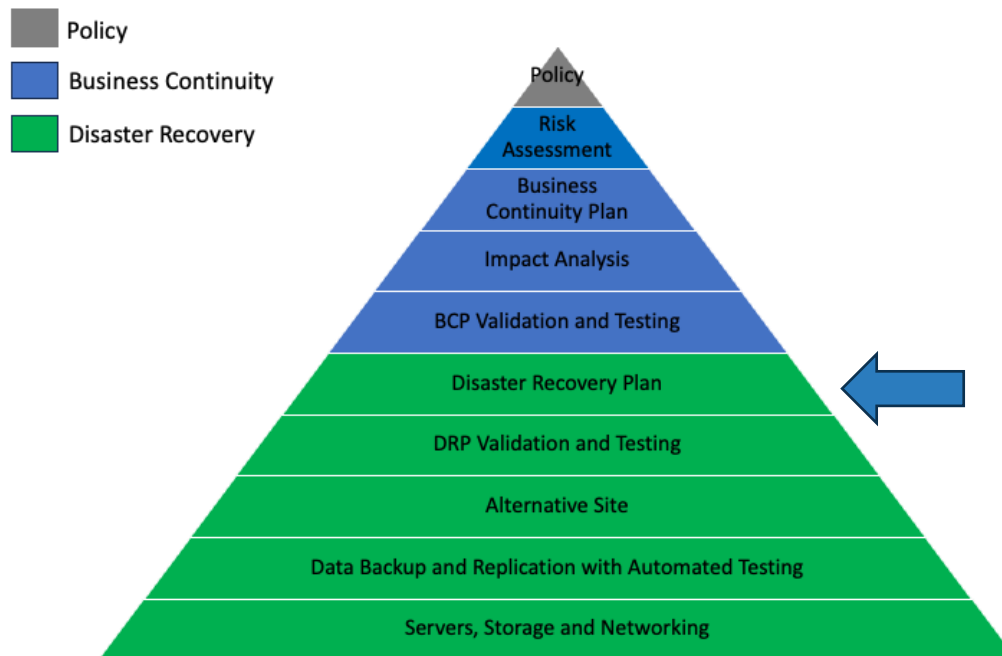


— CERN — OCI

Conclusions

- **BC & DR is a process**
 - Never really completed and finalized
 - Cloud resources add much needed flexibility
- **Considerable amount of work already done**
 - Transparent network access to OCI resources
 - Quick provisioning of database replicas in OCI
 - Oracle Database service DR at COBIT Level 4 – Predictable process
- **DR test trade-offs**
 - Complexity of disaster recovery solution vs. Cost
 - Verified disaster recovery plan vs. Production downtime

Future strategy



Outlook

- **BC scale / cost estimation**
 - Where to draw the line between resiliency and cost?
- **Security hardening**
 - Central Key Management implementation
 - Dynamic security lists
 - Immutable backups
- **Observability improvement**
 - Security policies auditing
 - Usage monitoring

Credits

CERN

- Stoumpis, Alexandros
- Dafonte Perez, Eva

Oracle

- Chardonnerau, Şengül
- Hurel, Sebastien
- Jung, Stefan
- Designe, Jérôme
- Poulin, Audrey
- Pedregal-Martin, Cristobal





Q & A