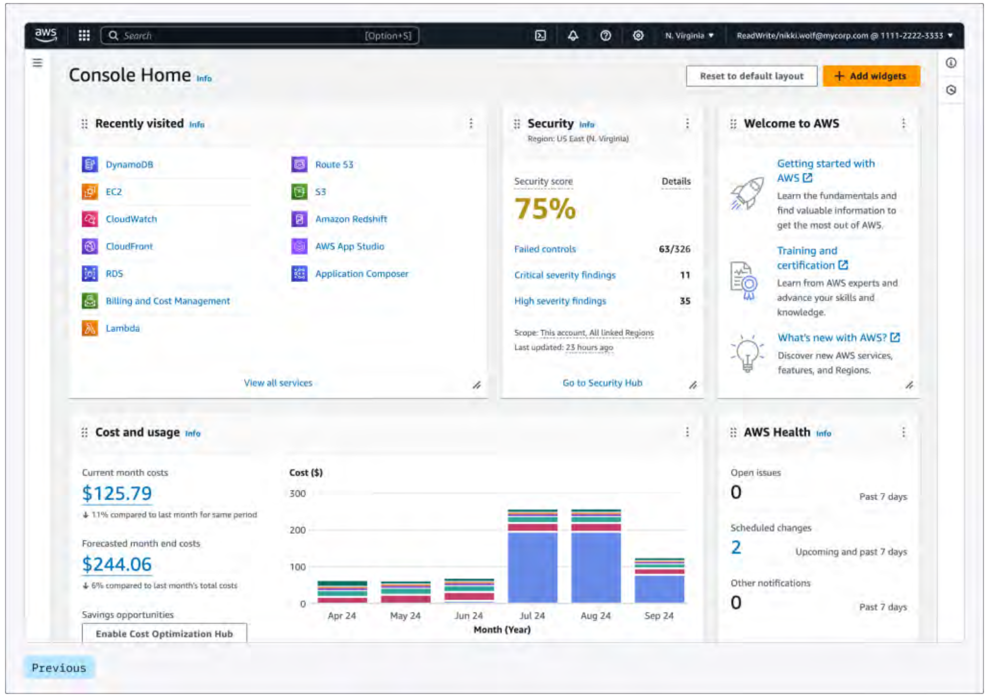
Doing more with Cloud API's

Capgemini

The Cloud Infrastructure (based on major Hyperscalers)

- Cloud environments are generally managed via a portal as it provides a quick, easy (sometimes) interface which can get people up-and-running quickly, with minimal training.
- The console is a visual representation of the underpinning API's which are how the vendor actually controls the environment
- The GUI (Graphical User Interface) is designed to be very intuitive, and as such some complex features from the API's are sometimes excluded



- This presentation is mainly going to use examples from Oracle Cloud, although the concepts are valid for AWS, Azure, GCP and most other major Cloud providers

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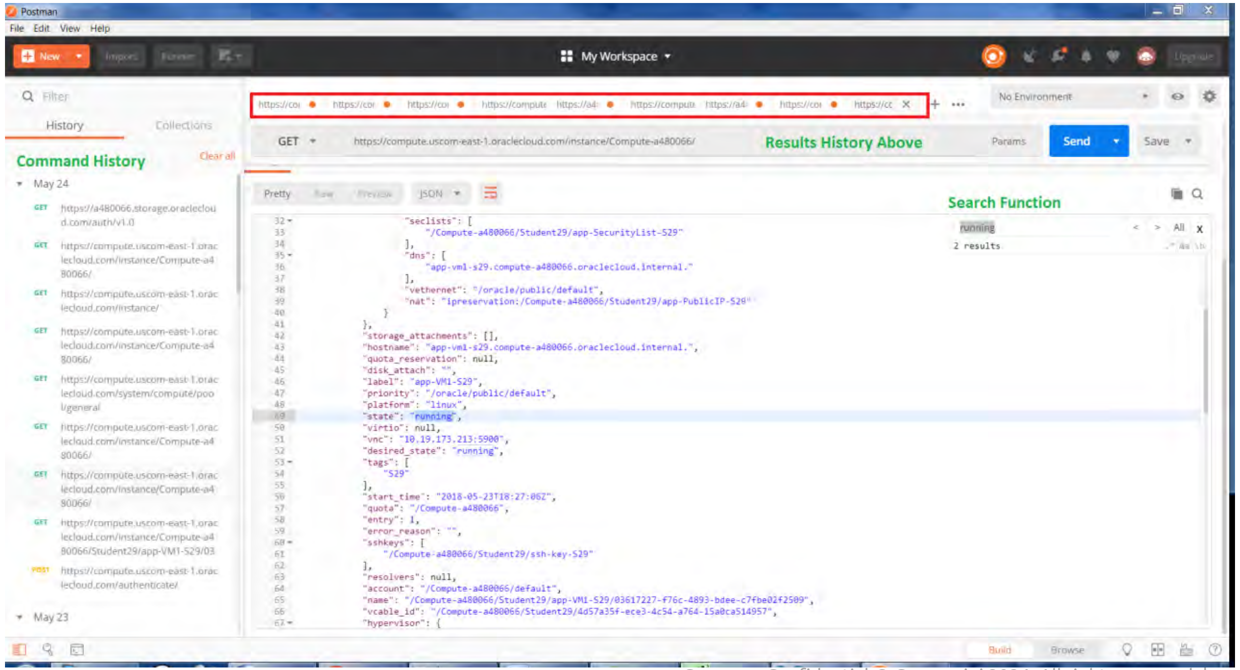
Why use an API ?

- The API's tend to have more functionality than the portal
- You can use API's to automate cloud processes with a bit of coding, often referred to as "the CLI" – Command Line Interface The API's (CLI) is designed to operate every aspect of the cloud environment

- With a little coding, commands can be daisy-chained together to perform fully-automated, complex operations
- Most hyperscalers provide bash, python, Java, .Net SDK's for accessing the CLI.
- The API's are often considered "dangerous" because they are more feature rich, but it is assumed that if you have the skills to understand the API's, you are aware of the risks.



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API methods

- The most common type of API's are REST (Representational State Transfer) using web based calls (e.g. postman)
- REST API's will get, put, delete, update etc

- Vendors also have compiled versions of the API's (the CLI) which does all the complex stuff like authentication, token management etc

bash

```bash
oci compute instance launch \
  --availability-domain "Uocm:PHX-AD-1" \
  --compartment-id "ocid1.compartment.oc1..aaaaaaaarhifmvrvuqtye..." \
  --shape "VM.Standard.E4.Flex" \
  --shape-config '{"ocpus": 2, "memoryInGBs": 16}' \
  --display-name "MyCliInstance" \
  --image-id "ocid1.image.oc1..aaaaaaaaxmpl..." \
  --subnet-id "ocid1.subnet.oc1..aaaaaaaaxmpl..." \
  --assign-public-ip true \
  --metadata '{"ssh_authorized_keys": "ssh-rsa AAAAB3Nza..."}'
```


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What is the CLI

- OCI CLI (python based)
- “Compiled” linux binaries, so can use bash to create scripts. Python is another common SDK
- Calls “compute instance” to get a list of compute instances in a compartment
- Returns data in JSON format (other formats available)

```
[[redacted]on ~]$ oci compute instance list --compartment-id ocid1.compartment.oc1..aaaaaaaa2q36lqc2d53xj4t[redacted]v4mu3pg23vqema        {
 "data": [
   {
     "agent-config": {
       "are-all-plugins-disabled": false,
       "is-management-disabled": false,
       "is-monitoring-disabled": false,
       "plugins-config": [
         {
           "desired-state": "DISABLED",
           "name": "WebLogic Management Service"
         },
....
       ]
     },
     "availability-config": {
       "is-live-migration-preferred": null,
       "recovery-action": "RESTORE_INSTANCE"
     },
     "availability-domain": "bNAX:UK-LONDON-1-AD-1",
     "capacity-reservation-id": null,
     "cluster-placement-group-id": null,
     "compartment-id": "ocid1.compartment.oc1..aaaaaaaa2q36lqc2[redacted]pg23vqema",
     "dedicated-vm-host-id": null,
     "defined-tags": {
       "Budget": {
         "Project": "Admin"
       },
       "Operations": {
         "Application": "Middleware",
         "Environment": "UAT",
         "License": "Oracle Fusion Middleware Enterprise Edition"
       },
       "Oracle-Tags": {
....
     "display-name": "Automation-test1",
     "extended-metadata": {},
     "fault-domain": "FAULT-DOMAIN-1",
     "freeform-tags": {},
     "id": "ocid1.instance.oc1.uk-london-1.anwgiljrrtacmgicpvy[redacted]dhmsuiv7ijkcgliha",
     "image-id": "ocid1.image.oc1.uk-london-1.aaaaaaaasfrbl2piedint[redacted]pjgnyv4khwra",
     "instance-configuration-id": null,
     "instance-options": {
       "are-legacy-imds-endpoints-disabled": false
     },
 ...
```


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What data is available ?

- Basic information
  - Inventory – how many databases, compute instances etc do I have
  - Build dates / data versions etc
  - Status – What's up, what's down
  - Statistics – Capacity (CPU/Memory), storage etc
- Complex information
  - Performance Statistics
  - Cost

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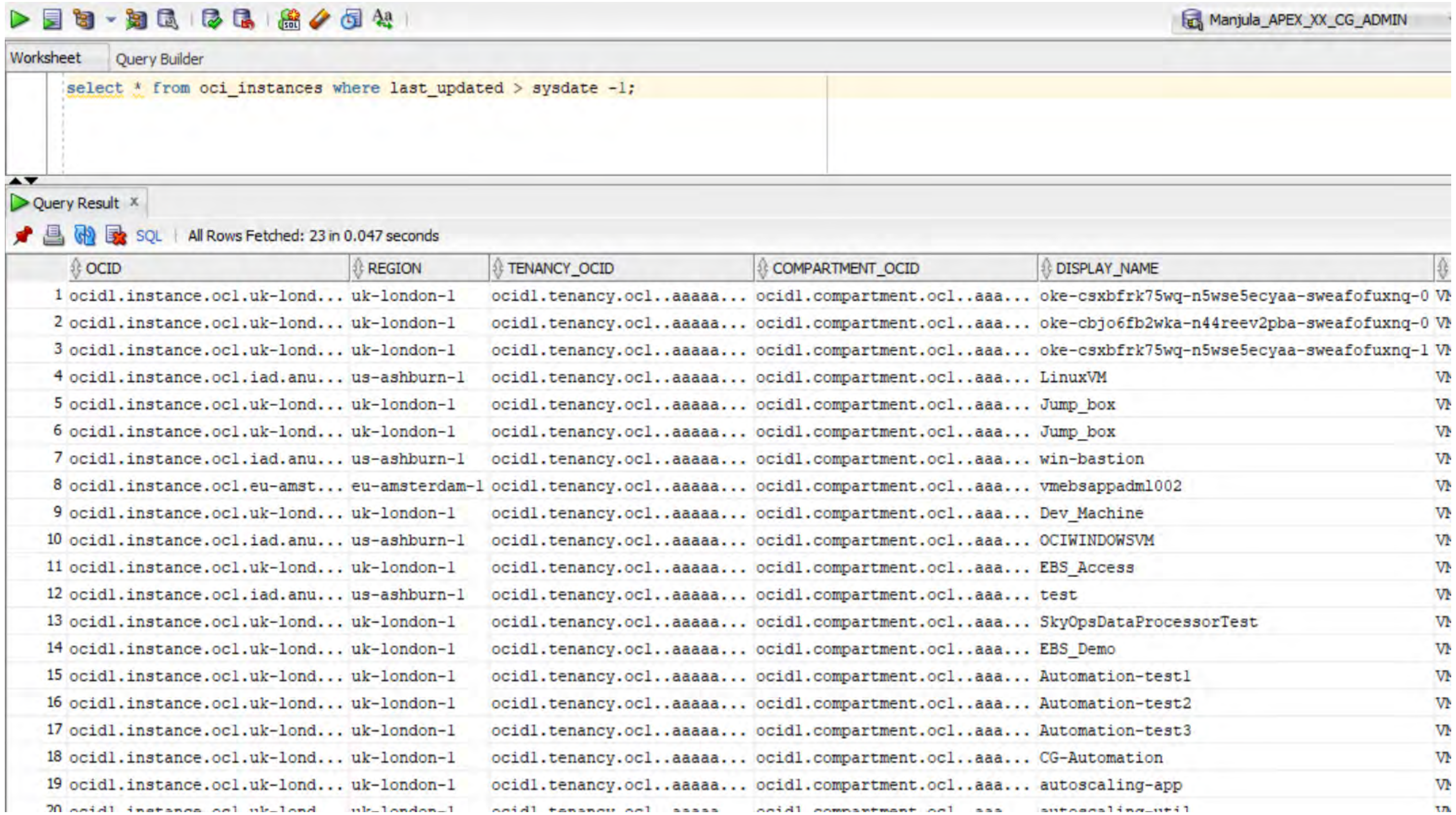
Where to put the data ?

- Ultimately, the idea is to use this data for other things, and so we want to store it.. In a database
- This allows us to perform more complex operations on the data, for example using AI to analyse trends
- We can also use the data to feed upstream systems, build apps, or carry out more advanced operations e.g.
  - Use the definition of a database as the basis of cloning from another
- Follow a simple method:
  - Extract data (to JSON, for example)
  - Load it into a table in the database



	OCID	REGION	TENANCY_OCID	COMPARTMENT_OCID	DISPLAY_NAME
1	ocid1.instance.oc1.uk-lond...	uk-london-1	ocid1.tenancy.oc1..aaaaa...	ocid1.compartment.oc1..aaa...	oke-csxbfrk75wq-n5wse5ecyaa-sweafofuxnq-0
2	ocid1.instance.oc1.uk-lond...	uk-london-1	ocid1.tenancy.oc1..aaaaa...	ocid1.compartment.oc1..aaa...	oke-cbjo6fb2wka-n44reev2pba-sweafofuxnq-0
3	ocid1.instance.oc1.uk-lond...	uk-london-1	ocid1.tenancy.oc1..aaaaa...	ocid1.compartment.oc1..aaa...	oke-csxbfrk75wq-n5wse5ecyaa-sweafofuxnq-1
4	ocid1.instance.oc1.iad.anu...	us-ashburn-1	ocid1.tenancy.oc1..aaaaa...	ocid1.compartment.oc1..aaa...	LinuxVM
5	ocid1.instance.oc1.uk-lond...	uk-london-1	ocid1.tenancy.oc1..aaaaa...	ocid1.compartment.oc1..aaa...	Jump_box
6	ocid1.instance.oc1.uk-lond...	uk-london-1	ocid1.tenancy.oc1..aaaaa...	ocid1.compartment.oc1..aaa...	Jump_box
7	ocid1.instance.oc1.iad.anu...	us-ashburn-1	ocid1.tenancy.oc1..aaaaa...	ocid1.compartment.oc1..aaa...	win-bastion
8	ocid1.instance.oc1.eu-amst...	eu-amsterdam-1	ocid1.tenancy.oc1..aaaaa...	ocid1.compartment.oc1..aaa...	vmebsappadm1002
9	ocid1.instance.oc1.uk-lond...	uk-london-1	ocid1.tenancy.oc1..aaaaa...	ocid1.compartment.oc1..aaa...	Dev_Machine
10	ocid1.instance.oc1.iad.anu...	us-ashburn-1	ocid1.tenancy.oc1..aaaaa...	ocid1.compartment.oc1..aaa...	OCIWINDOWSVM
11	ocid1.instance.oc1.uk-lond...	uk-london-1	ocid1.tenancy.oc1..aaaaa...	ocid1.compartment.oc1..aaa...	EBS_Access
12	ocid1.instance.oc1.iad.anu...	us-ashburn-1	ocid1.tenancy.oc1..aaaaa...	ocid1.compartment.oc1..aaa...	test
13	ocid1.instance.oc1.uk-lond...	uk-london-1	ocid1.tenancy.oc1..aaaaa...	ocid1.compartment.oc1..aaa...	SkyOpsDataProcessorTest
14	ocid1.instance.oc1.uk-lond...	uk-london-1	ocid1.tenancy.oc1..aaaaa...	ocid1.compartment.oc1..aaa...	EBS_Demo
15	ocid1.instance.oc1.uk-lond...	uk-london-1	ocid1.tenancy.oc1..aaaaa...	ocid1.compartment.oc1..aaa...	Automation-test1
16	ocid1.instance.oc1.uk-lond...	uk-london-1	ocid1.tenancy.oc1..aaaaa...	ocid1.compartment.oc1..aaa...	Automation-test2
17	ocid1.instance.oc1.uk-lond...	uk-london-1	ocid1.tenancy.oc1..aaaaa...	ocid1.compartment.oc1..aaa...	Automation-test3
18	ocid1.instance.oc1.uk-lond...	uk-london-1	ocid1.tenancy.oc1..aaaaa...	ocid1.compartment.oc1..aaa...	CG-Automation
19	ocid1.instance.oc1.uk-lond...	uk-london-1	ocid1.tenancy.oc1..aaaaa...	ocid1.compartment.oc1..aaa...	autoscaling-app

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OK, now I have a database.. What now

In Oracle security is managed through the use of policies and groups:

- Groups are created, and policy statements created which reference the group e.g.
  - Allow group TesterA to manage compute-instances in compartment MainTest
- Users are then assigned to groups to give them access to resources

- However, if I wanted to see what permissions a user has, I would need to look through every policy statement to understand where the groups are referenced

- If all the groups and policy statements are extracted into tables in a database, it's a simple matter to:
  - Join the tables together to show what permissions a user has
  - Using date/time stamps show how a users access changes over time
  - Use AI to monitor and alert if a user's access violates certain conditions

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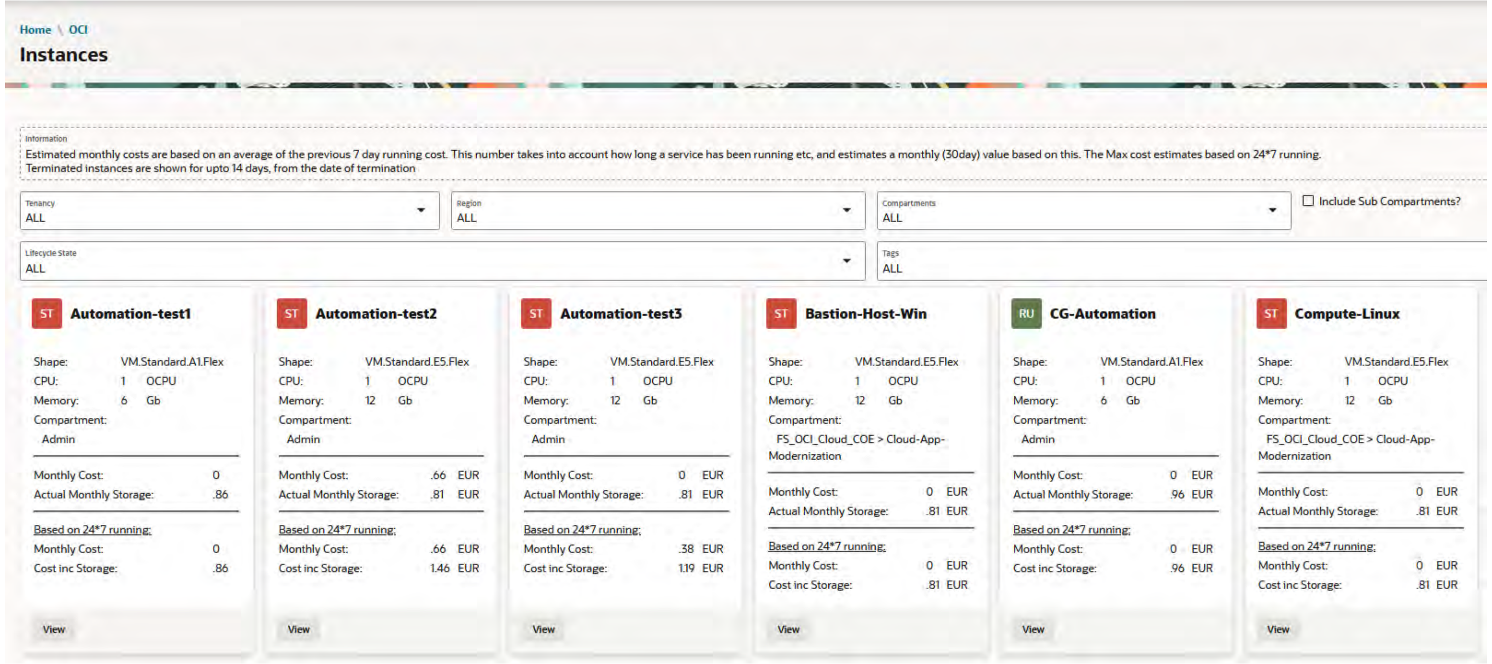
Now the fun begins

- Using tools like Oracle APEX, we can build complex applications on top of the Cloud environment, fed by the metadata which we are continuously loading in the database.
- Allows use to provide a user with a more “tailored” solution for example:
  - Allow a developer to perform their own backups and restores on their personalized DEV environment, without them needing to know any of the technical info behind the request
  - Start and Stop environments using hierarchical groupings, so a single “Group” start will always start the database before the application nodes
  - Give users more information in a user-friendly manner such as “Starting this development environment on a Saturday will cost £100. Are you sure you want to override the weekend shutdown ?”



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Where to get more information

Check out the vendor specific API pages e.g.

- https://docs.oracle.com/en-us/iaas/Content/API/Concepts/cliconcepts.htm
- https://aws.amazon.com/cli/

Some information on using API's in complex methods:

- https://jasonlesterdba.wordpress.com/

Feel free to contact me

- Jason.Lester@Capgemini.com
- https://www.linkedin.com/in/jasonrlester/

Loads of other blog resources, and AI can guide you to a lot of this material

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