UIT ET Technical Services

DR (Livermore) to Cloud (AWS)
What are the goals of moving DR to Cloud?

- UIT goal - Retiring Livermore Data Center.
- ET goal - Learn how to work with Cloud technologies while focusing on retirement goal.
What is the result?

- We migrated our DR applications to the Cloud.
- We took advantage of AWS features, Terraform, Packer to be able to build our applications and EC2/Servers quickly and consistently.
- Developed a new patching method that reduced downtime.
- We use Oracle DataGuard Technology to setup real-time database replication to Cloud
- We use Rsync to sync up application code tree from on-prem servers.
- We have implemented Minsec components on ec2s like Duo, splunk, etc...
Servers and More

CIA
- 2 servers Apache, Tomcat, Oracle 12.1

DMR
- 7 servers

FSS/RA
- FSS:
  - 2 for eBiz -- ebiz tech stack, 11.1.2 & 12.1.3 tech stack
  - 2 for OFIMGPRD with weblogic 12.1.3 and Apex
- RA:
  - 2 for SeRA with 12.1.3 and Apex
  - 2 for eProtocol with Apache & Tomcat tech stack

PS
- 13 servers

- In total, over 50 ec2s and 100TB storage provisioned in AWS
Team Work (SA and Application Infrastructure)

• Collaboration was key when learning these new technologies, as it brought us closer to other teams to work together and solve new unfamiliar issues.

• Learning a tiny bit every day to validate the understanding of AWS, Terraform, Packer, and Jenkins.

• Many Working Sessions between Armand’s server teams and Toai’s Infrastructure teams
  • Define roles and responsibilities. Objectives included satisfying the Yearly Audit with PWC (mostly in relation to segregation of duty)
  • How to setup Networking, ELB, SG, Servers.
  • Weekly brown bag sessions between SA and Application Infrastructure teams to work out the approach for “Infrastructure as Code” (hundreds of building and tearing down the servers).

• All this learning took about 6 months…
What are the Experiences and lessons learned?

• Big hurdle at first was finding time, as our jobs didn't stop with supporting the current infrastructure while trying to learn this new one.

• Attending training sessions and self learning

• With anything new - take the leap and just start working on it!

• Changing practices to leverage AWS technologies when replacing on premise infrastructure, a few to note (there are much more):
  • Using ec2's instead of physical hosts or vms
  • Using EBS/S3/EFS instead of netapp or emc storage
  • Using ELB/ALB instead of F5 for load balancing
  • Using AMI's for security patching instead of directly patching live hosts

• When sizing ec2’s or instances or resources, start small and increasing compute as needed.
What are the Experiences and lessons learned (cont’d…)?

• With these new technologies, there of course was a learning curve in the beginning to change and adopt to different practices for Cloud
  • Instead of provisioning a physical host, going through procurement with hardware, etc.. or even going through VMware vcenter console for virtual hosts, the team learned how to use new software (Terraform).
  • With learning Terraform, we are now able to provision most of the infrastructure with this tool. An example of some of these resources are compute (ec2), storage (s3, ebs, and efs), as well as host based fw with security groups.

• Private Networking Space that doesn’t allow us to go out to internet.
  • Adding public interfaces and gateways to private hosts.
  • Hosts behind load balancers had issues even with public interfaces, so we had to create intermediary hosts on public networks that helped to transfer data.
What are the Experiences and lesson learned (cont’d…)?

- Need dedication since we also have operational work to perform.
  - Many people worked off hours, weekends, and holidays to get all this work done.
  - Personnel resources are still a challenge.
- Brainstorm sessions between teams helped build standard agreements
  - Excellent experience, everyone working toward a common goal.
  - Quickly identify and work through issues/challenges.
- Don’t feel bad if you have to change the standard agreements frequently.
  - These were learning sessions, sometimes our understanding changed after implementation.
- Application and Database Automated Builds
  - Allows for standardization using templates for configuration files, job streams, and operational support.
  - Start with something you know well.
  - Most of our on-premise Server are on private space network. Watch for integrations without public network.
What are the Experiences and lesson learned (cont’d…)?

- DB connectivity for db between difference practice teams (VPC).
  - Standard VPC subnet template, subnet per availability zone.
  - AWS transit gateway, similar to VPC peering, it is easier to manage and
    able go between accounts
- Tagging can be a big challenge.
  - the IAM roles and policy
  - Using Lambda job to take snapshot on all EBS
- Different Instance Type (Server class) for performance and cost optimization.
  - M4 vs M5,
  - large vs xlarge vs 2xlarge
  - Reserved Instance vs On Demand
- VPN tunnel to VPC
  - 1.25Gbps limit
# Acknowledgements

Toai Vo - Oversight, Direction, Guidance, and Lots of Code Examples

<table>
<thead>
<tr>
<th>CIA Team</th>
<th>DMR Team</th>
<th>Core Infra Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laurie D Miller - Automated Builds</td>
<td>Eric San Andres</td>
<td>Stanley Lee</td>
</tr>
<tr>
<td>Karen Tsai - Jira/Confluence</td>
<td></td>
<td>Ren You</td>
</tr>
<tr>
<td>Ariel Ordonez - ALB/SSL</td>
<td></td>
<td>Pablo Hernandez</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sid Obra</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FSS/RA Team</th>
<th>PS Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lavanya - Oracle Financials</td>
<td>Jen Hong</td>
</tr>
<tr>
<td>Kumar Madduri - SeRA</td>
<td></td>
</tr>
<tr>
<td>Suma Madduri - eProtocol</td>
<td></td>
</tr>
<tr>
<td>Ramani - Oracle Image (OFIMG)</td>
<td></td>
</tr>
<tr>
<td>Dilip - Server Infra/PeopleSoft</td>
<td></td>
</tr>
<tr>
<td>o Unix server build scripts</td>
<td></td>
</tr>
<tr>
<td>o PeopleSoft</td>
<td></td>
</tr>
</tbody>
</table>

**ERP Linux Team**

Calvin Hom
Emil Popov
Sanjib Goswami
Joe Zhu
Tony Chu
Bala Subramani K
**What are the next steps?**

- Automation (CD/CI) process.
- Qualys in POC stage with ISO
- Incorporate Vault for passwords
- Review and Improve Cost Optimization.
- More Containers and Kubernetes
- Project - RDS SQL Server for Cardinal Print
- Project - Move Jira and Confluence production to Cloud
- Project - more environments to Clouds with clear budgeting.
Questions & Answers?