Going DevOps in GovCloud Trials and Travails

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GovCloud 101 – Status and Capabilities

- Commercial Clouds provide regions for Government and DoD Users
- DoD Cloud Computing Security Resource Guide:
  - Impact Level (IL) 1: Public Release
  - Impact Level (IL) 2: Non-Controlled Unclassified Information
  - Impact Level IL) 3: No longer used
  - Impact Level (IL) 4: Controlled Unclassified Information – including export controlled, personally identifiable information, or protected health information
  - Impact Level (IL) 5: Controlled Unclassified Information that requires higher level of protection – including National Security Systems (NSS)
  - Impact Level (IL) 6: Classified information up to Secret
- DoD and Federal Cloud options (Examples):
  - AWS GovCloud: IL5
  - Microsoft Azure – DoD Government Region: Provisional IL5
  - IBM SmartCloud: IL5
  - Oracle Federal Managed Cloud Services: IL5
  - MilCloud 2.0 (DISA): Provisional IL5
  - AWS Secret Region: Provisional IL6

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GovCloud for Scalable DevOps

- Cloud Deploy Trades:
  - All Development or I&T Environments only
  - Operational Deployment in a cloud
  - SaaS, IaaS, or PaaS

- Strategies:
  - Local Data Center – all development and checkout on-premises
  - Cloud Development – users remotely connect to cloud for development and I&T DevOps pipelines
  - Hybrid Development
    - Software Development and Build / Unit Test in data center
    - Scalable software integration environment in cloud

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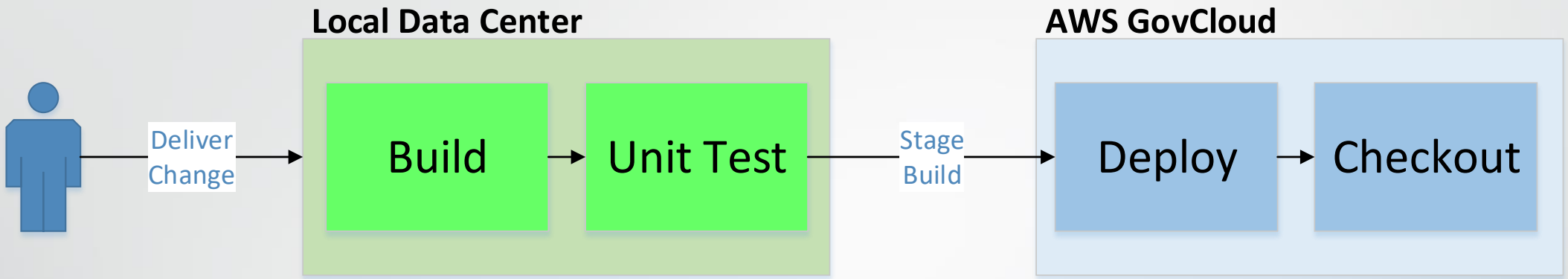
Hybrid Development Summary



- Build and Checkout pipeline runs on developer change commit
  - Development, Build, and Unit Test occur in local environment
  - Deploy and Checkout into software integration sandbox within GovCloud
- GovCloud provides massive on-demand scalability for software integration
  - Instantiate 50+ node environment for each build delivery to run automated checkout
  - Tear down environment after checkout is complete (1 – 4 hours)
  - Massive parallel pipeline – up to 50x environments can run, limited only by licensing

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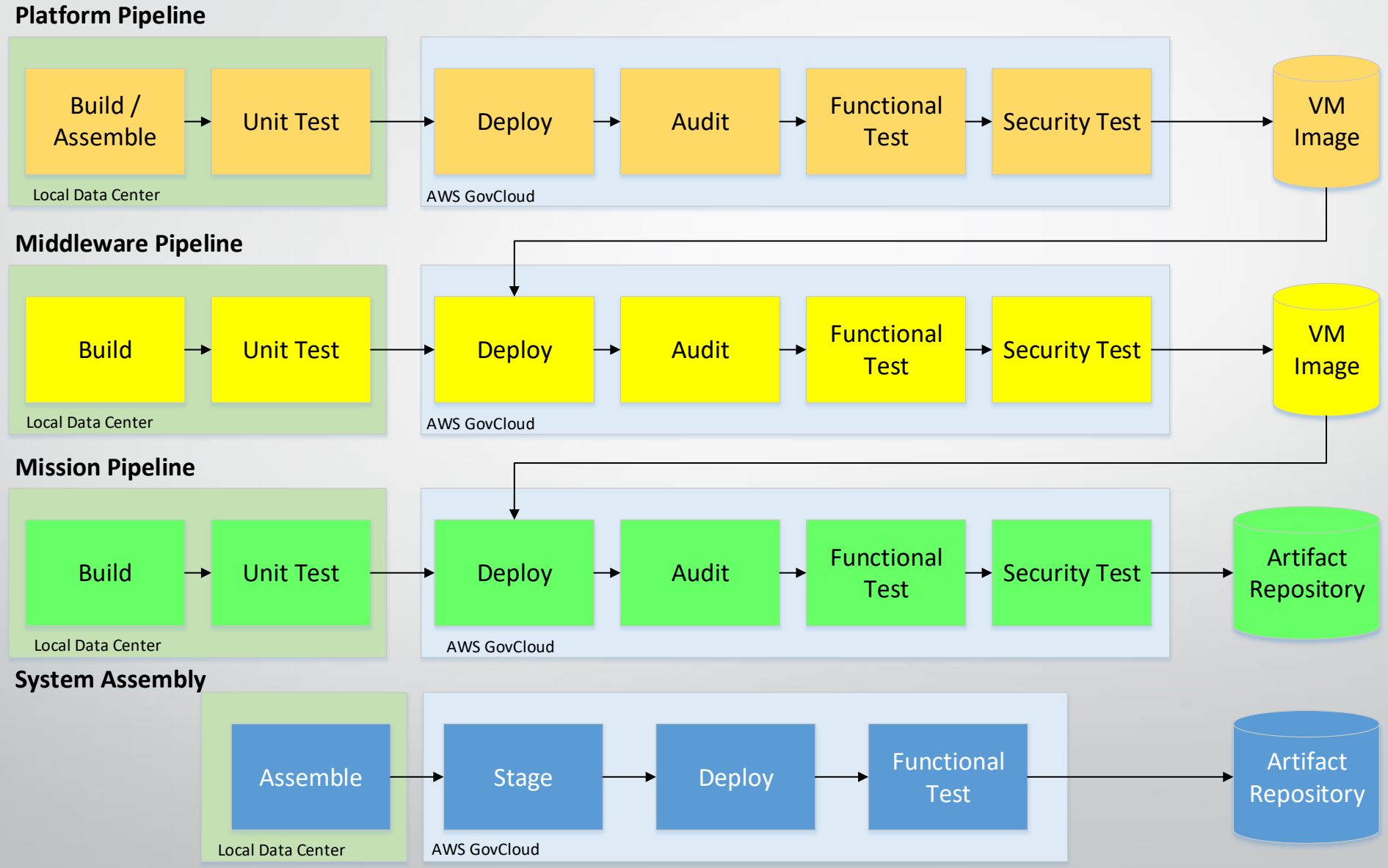
Layered Multiphase Pipeline



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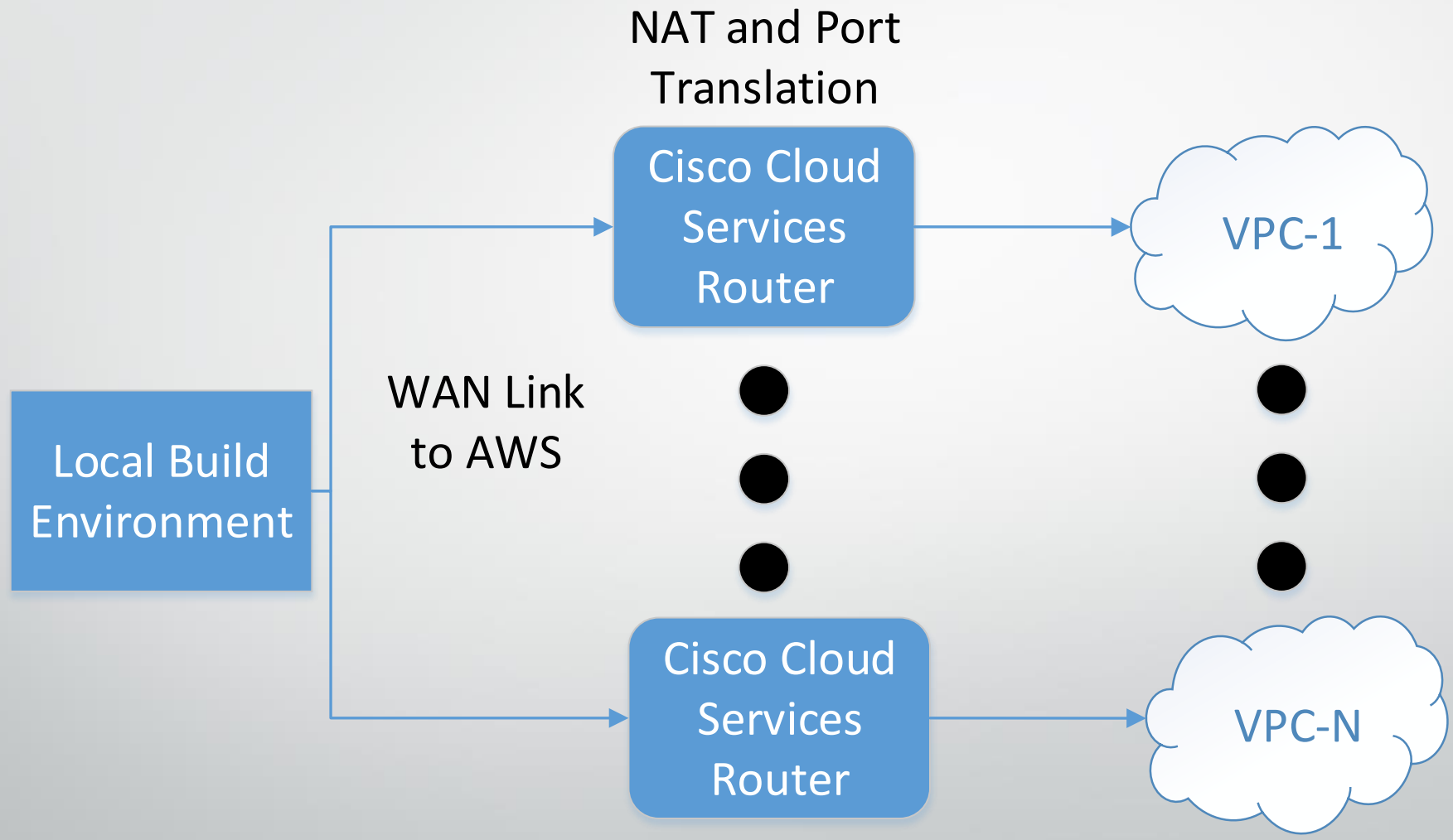
Network Architecture



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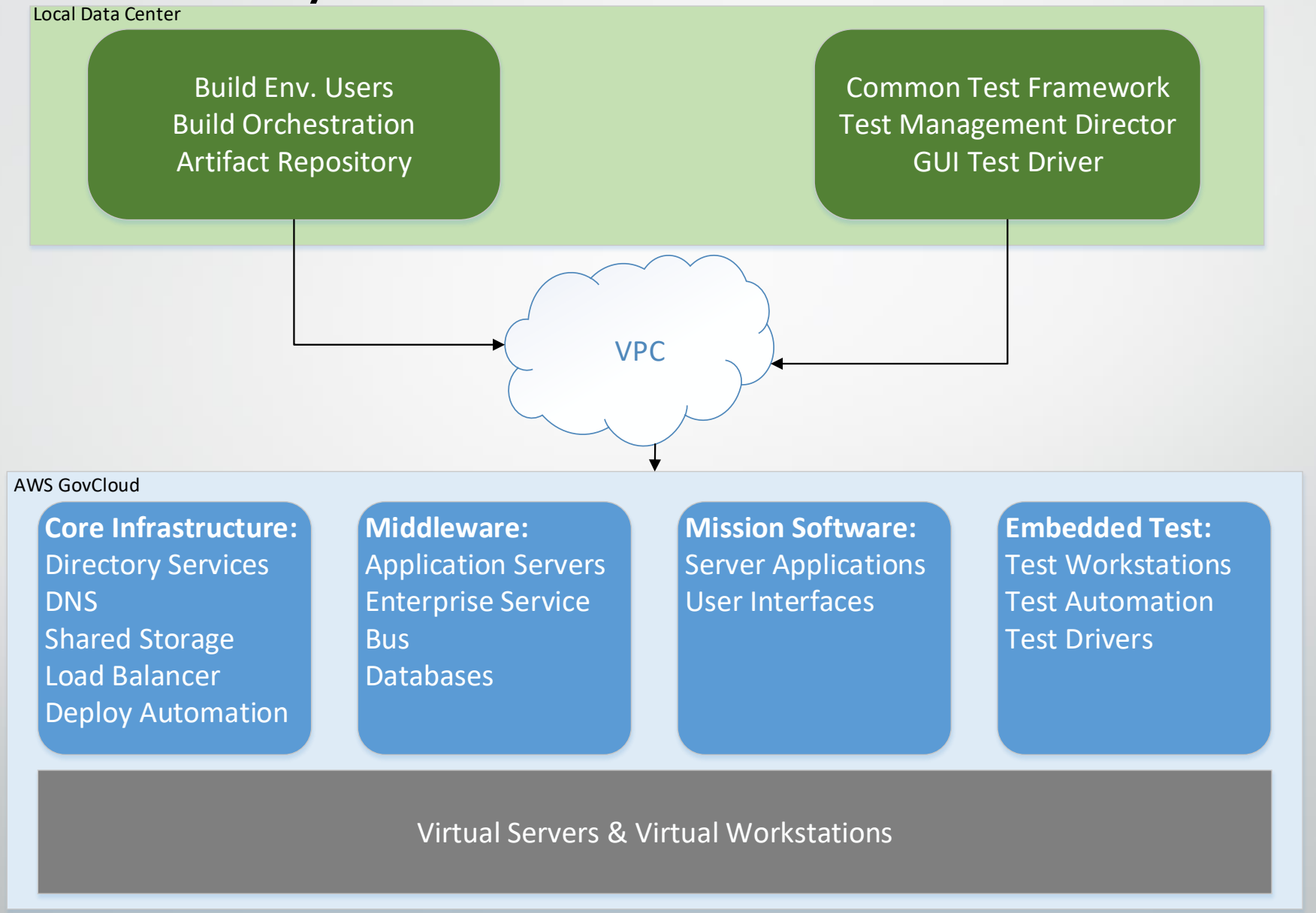
Physical Architecture



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Designing for GovCloud

- Design for virtualization
  - Drives both cost savings and improved performance
  - Utilize larger number of VMs with smaller CPU and memory allocations
- Dynamic management of footprint based on utilization
  - Define core footprint and assess scalability needs and strategy
  - Reserved vs. On-Demand allocations of nodes
- Leverage Cloud-Specific Infrastructure and Design
  - Load balancers, storage arrays, and networks are all very different in the cloud
- Configuration Management in the Cloud
  - Managing and purging AMIs and DevOps Pipeline builds and results

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Going from GovCloud back to Data Centers

- AWS simplifies deploys – and can push integration challenges downstream

- Things that broke back in the data center:
  - Hardware Driver – Operating System compatibility issues
  - Network port bonding configuration
  - Fiber NIC card-switch compatibility

- AWS also abstracts virtualization setup and configuration
  - Virtualization software drives specific scripting and configuration – not universally portable
  - VMWare setup and provisioning drove additional develop and integration
  - Can convert VMs to AMIs and back – not always easy or fast

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Lessons Learned

- Legacy Physical Architecture not optimized for virtualization
  - Virtual machine performance optimized with increased count of smaller VMs
- Network performance paces cloud usage
  - WAN connection design drives data transfer and latency
  - WAN outages can stop all program development – design for redundant connections
- The cloud is different than physical compute infrastructure in data centers
  - Legacy designs need to change and adapt to the cloud
  - A fully integrated cloud deploy doesn't translate to working data center deploy
- Deploy operational systems to the cloud wherever possible
  - If you can do so, this really simplifies migration from development to production
  - Streamlined cloud deploys allow updates in minutes or even seconds

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