AWS re:Invent

Cloud Adoption in Higher Education

A Notre Dame Perspective

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amazon web services

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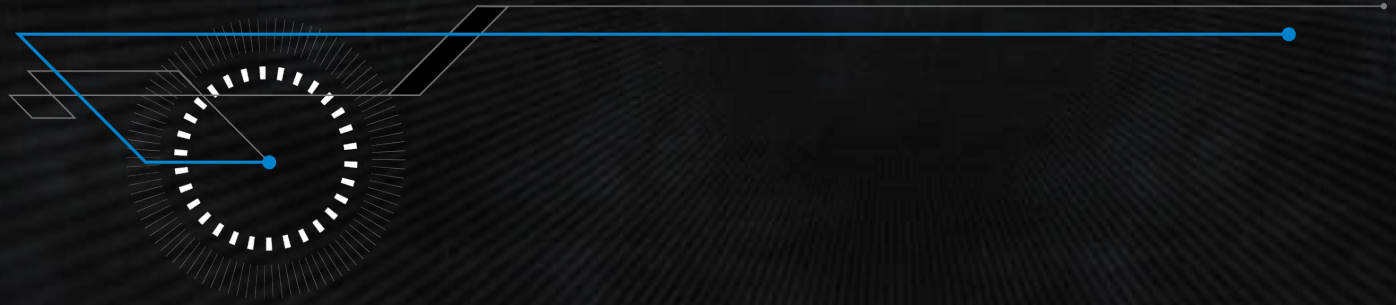
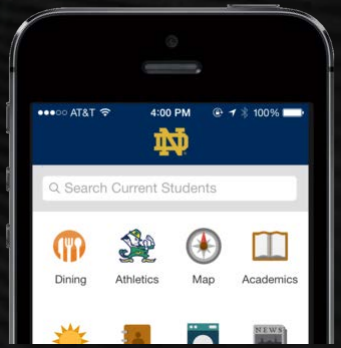
The Journey



Notre Dame's Journey Starts

- **2012: Start small, dream big**
  - Started working with AWS in 2012
  - Migrated www.nd.edu to AWS
- **2013-4: Experiment**
  - Migrated custom CMS
  - Server backups via a cloud storage gateway
  - ND Mobile App
  - Authentication



CAS

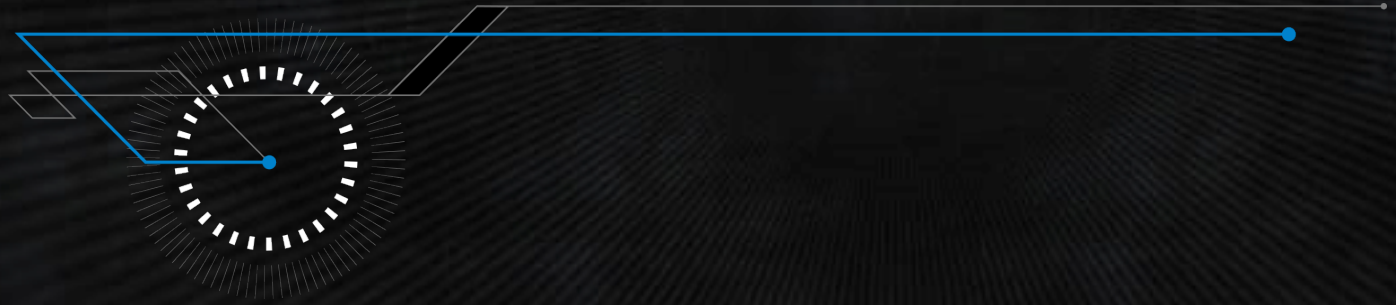
Shibboleth

Windows Active Directory

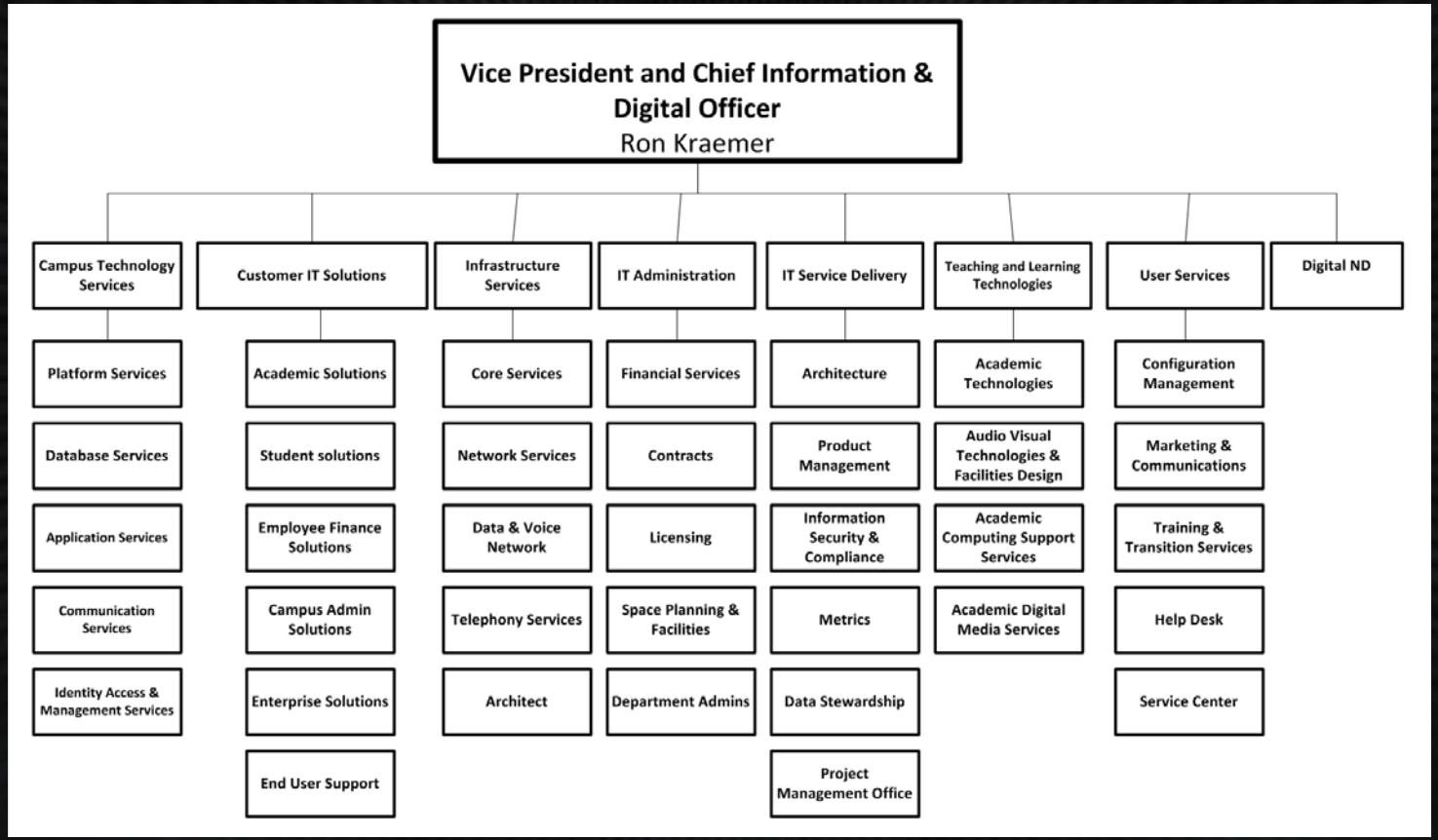
Putting AAA in AWS

- High Availability for off campus users
- Auto failover with Route 53
- AWS based domain controller, 389 Directory, CAS and Shibboleth
- Client Gateway VPN for Domain Controller Sync
- PostgreSQL RDS

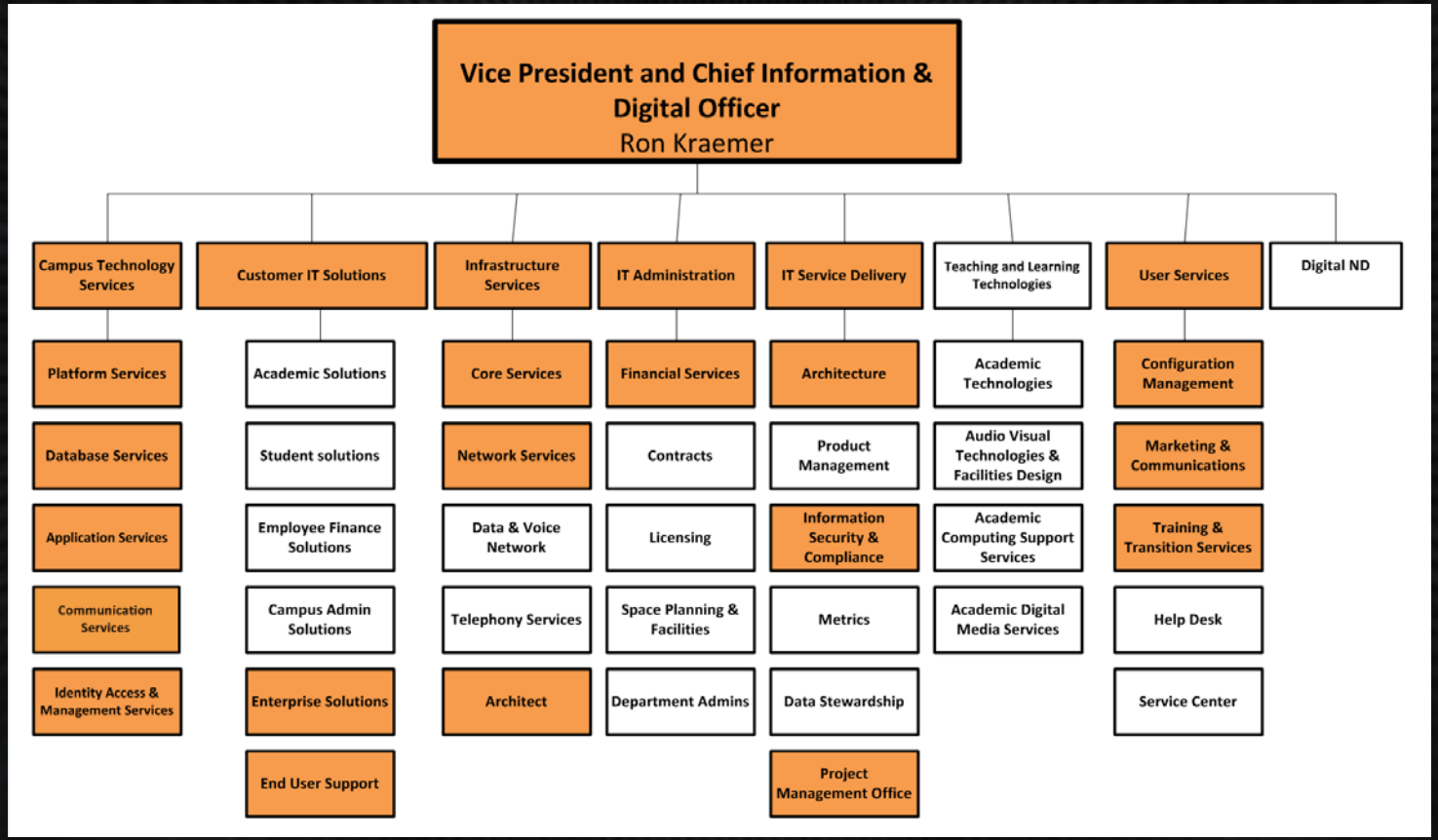
Acceleration



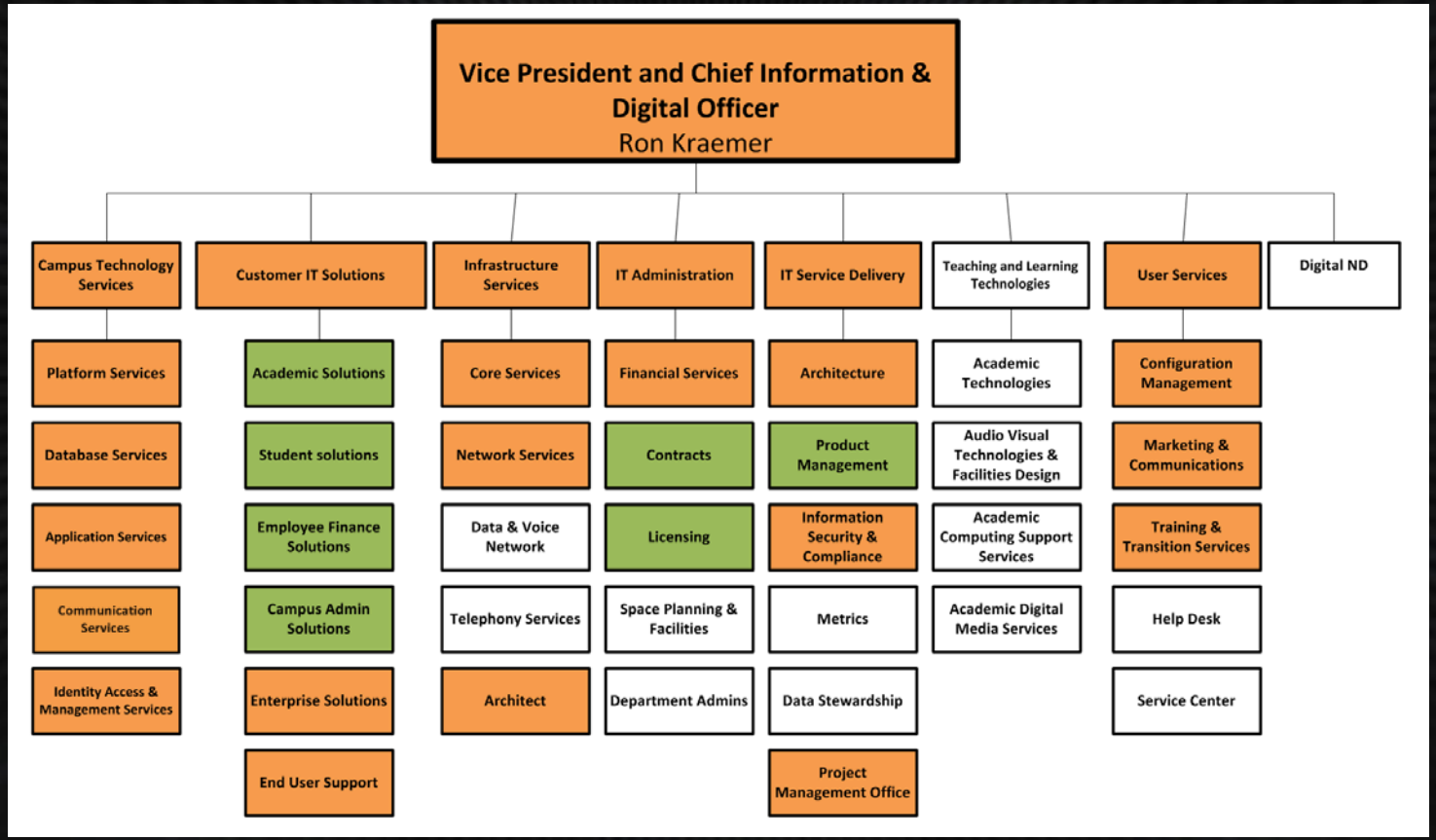
Dedicated Team



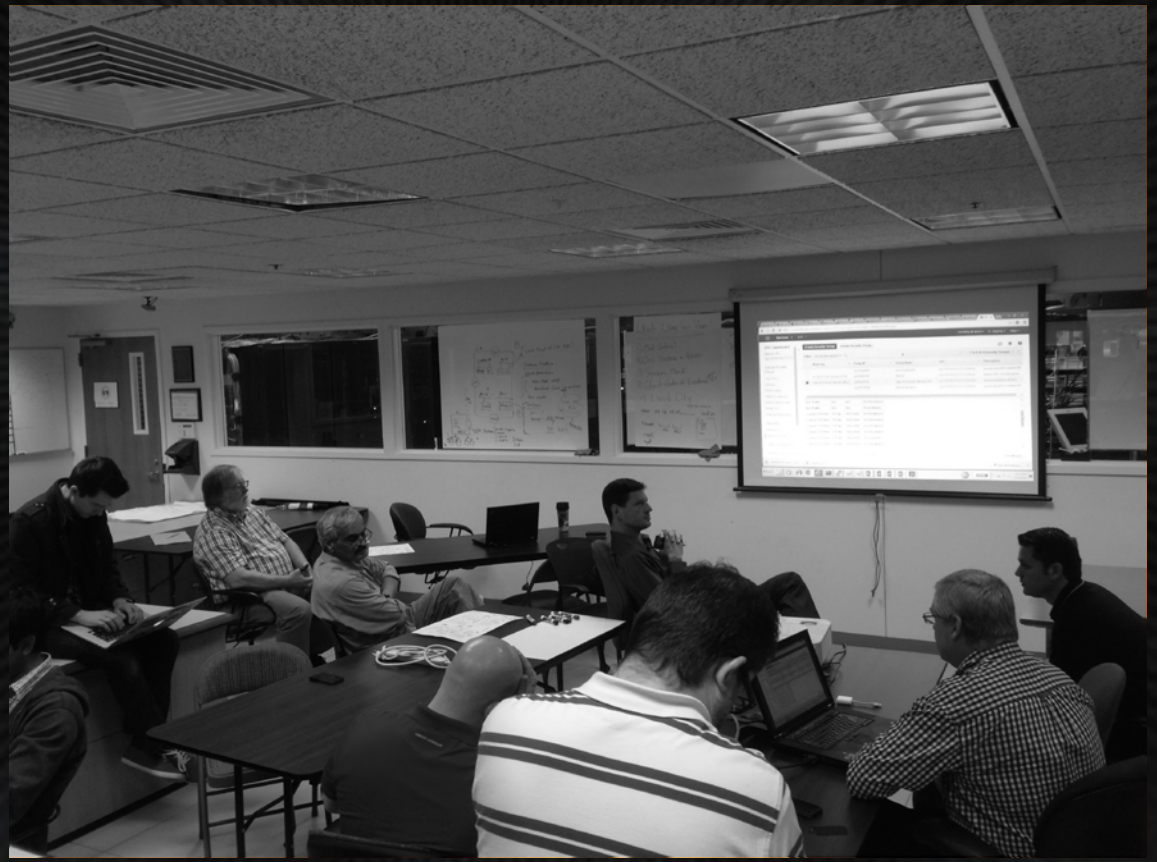
Dedicated Team



Augmented Team



Dedicated Space



Shared Mission: #NDCloudFirst

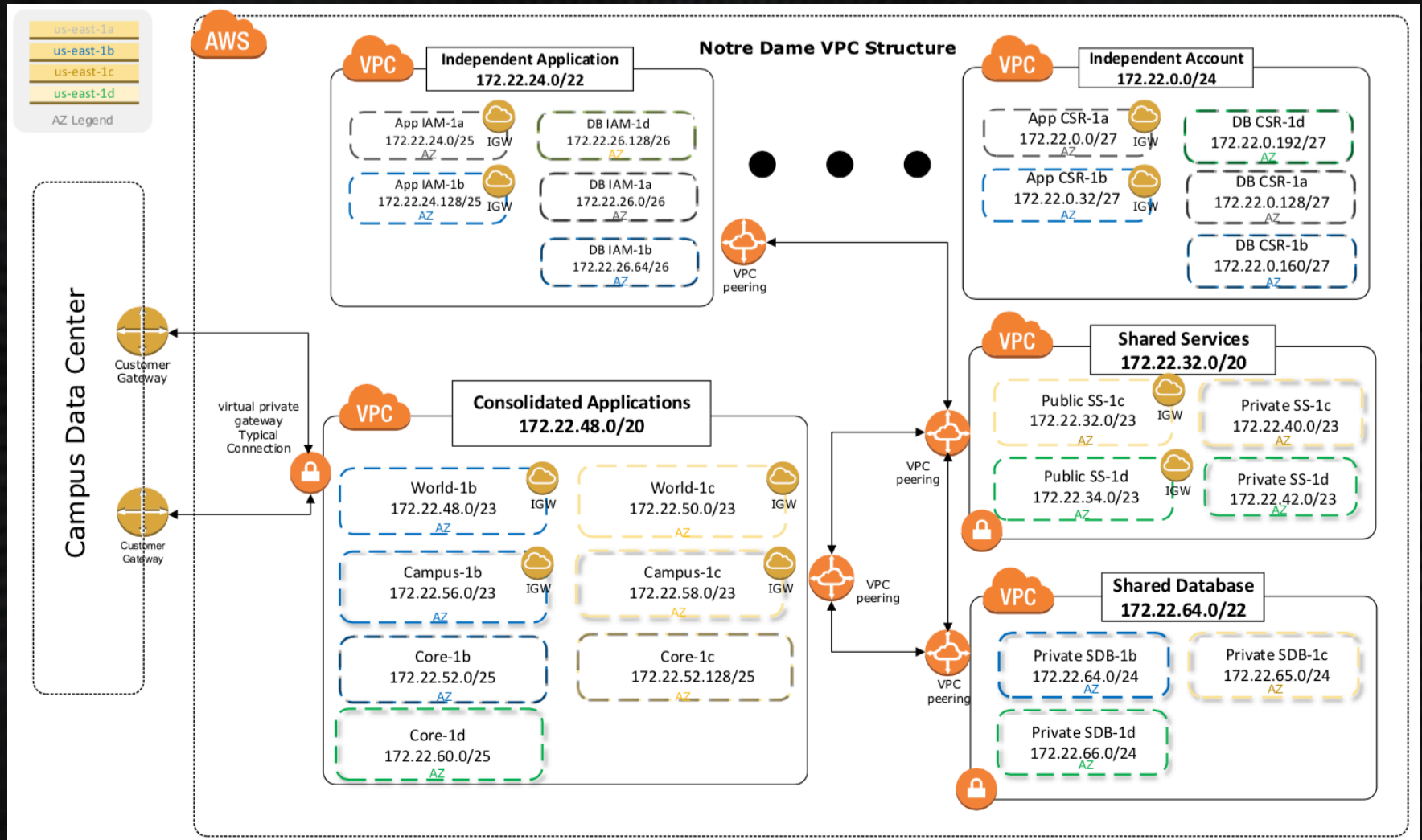
80% of IT service portfolio to be cloud based in 3 years

The To Do List

- ☑ Win hearts and minds
- ☑ Build out infrastructure foundation
- ☑ Develop a migration plan
  - 100% confident in core technology
  - Embed within upgrade cycles
- ☐ Recast, replace, or reinvent
  - Data center policies and procedures
  - RDS and DBAs
  - Separation of duties
  - Audit and Security

Things to Think About

- Network Strategy
- Troubleshooting
- Latency – what region? Are apps sensitive?
- Flip services during transition
- Customer Gateways, VPN Tunnels
  - Routing public and private addresses
  - What goes over tunnel versus Internet
  - Sizing on-premises equipment to support VPN tunnels
- Incident Response and Forensics


us-east-1a
us-east-1b
us-east-1c
us-east-1d
AZ Legend
AWS
Notre Dame VPC Structure
Campus Data Center
Customer Gateway
Customer Gateway
virtual private gateway
Typical Connection
VPC
Independent Application
172.22.24.0/22
App IAM-1a
172.22.24.0/25
AZ
IGW
App IAM-1b
172.22.24.128/25
AZ
IGW
DB IAM-1d
172.22.26.128/26
AZ
DB IAM-1a
172.22.26.0/26
AZ
DB IAM-1b
172.22.26.64/26
AZ
VPC peering
VPC
Independent Account
172.22.0.0/24
App CSR-1a
172.22.0.0/27
AZ
IGW
App CSR-1b
172.22.0.32/27
AZ
IGW
DB CSR-1d
172.22.0.192/27
AZ
DB CSR-1a
172.22.0.128/27
AZ
DB CSR-1b
172.22.0.160/27
AZ
VPC
Consolidated Applications
172.22.48.0/20
World-1b
172.22.48.0/23
AZ
IGW
World-1c
172.22.50.0/23
AZ
IGW
Campus-1b
172.22.56.0/23
AZ
IGW
Campus-1c
172.22.58.0/23
AZ
IGW
Core-1b
172.22.52.0/25
AZ
Core-1c
172.22.52.128/25
AZ
Core-1d
172.22.60.0/25
AZ
VPC peering
VPC peering
VPC peering
VPC
Shared Services
172.22.32.0/20
Public SS-1c
172.22.32.0/23
AZ
IGW
Private SS-1c
172.22.40.0/23
AZ
Public SS-1d
172.22.34.0/23
AZ
IGW
Private SS-1d
172.22.42.0/23
AZ
VPC
Shared Database
172.22.64.0/22
Private SDB-1b
172.22.64.0/24
AZ
Private SDB-1c
172.22.65.0/24
AZ
Private SDB-1d
172.22.66.0/24
AZ

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