Cloud computing for e-Governance Applications

Centre for Development of Advanced Computing
Chennai.

C-DAC Chennai

- C-DAC established its Chennai centre in the year 2005

Thrust areas

- Free/Open Source Software
  - National Resource Centre For Free/Open Source Software(NRCFOSS)
  - BOSS Linux Support Centre Project
- National Ubiquitous Computing Research Centre
- Grid Computing – GARUDA
- Cloud Computing Centre
- Advanced Computing Training School (ACTS)

NRCFOSS Phase II - an Overview

- NRCFOSS phase I completed in September 2008
  (Duration 3 Years – April 2005 to September 2008) Project cost INR 250 lakhs
- Funding agency – Department of Information Technology, Government of India
- Duration of the project : 3 years (May 2009 –May 2012)
- Cost of the project : INR 2064.79 lakhs
- A more open inclusive approach with multiple partners to enhance acceptability, visibility and reach (C-DAC Chennai, C-DAC Mumbai,
  C-DAC Hyderabad, C-DAC Delhi, IIT Madras, IIT Bombay, AU-KBC)
- Areas of focus – SME's , Education, Accessibility, Indian Language support, Localized applications
- Research on SaaS Framework, CoE in MID, FOSS issues etc
- BOSS to be used as the base for all development to ensure the reach to end users.

NRCFOSS – II @ C-DAC Chennai

- Development of SaaS stack delivery model
- Integration and development of Common desktop development infrastructure
- Setting up Centre of Excellence for Mobile Internet Devices based on BOSS Linux
- Development and enhancement of NRCFOSS portal which will become a platform where multidisciplinary organizations involved in Open Source
- Development of knowledge bank repository for scientific/ e-Governance applications
- Further additions and enhancements to BOSS Linux specific to education & scientific domain

Grid Computing

Objectives:

- Development of middleware for GARUDA Grid and extending the same as Cloud Services
- Develop a Open Source Grid Operating System, where the services of grid are brought down t0 kernel focusing on Desktop Grid. The ultimate aim is to bring Grid Computing to the desktop, and the desktop to the Grid.

4Tera Flop computing facility

- C-DAC Chennai houses 4 Tera Flop Garuda Cluster computing facility with the following details, Intel Xeon Quad Core processor counting to 320 CPU's with 6 Tera Byte SAS storage and 20 Tera Byte SATA storage are available. Network connectivity of 100 Mbps has been established between various C-DAC, centres and Garuda partners sites. Jobs of distributed computing nature, parallel processing, MPI jobs are running in this cluster.

Cloud Computing

- “a pay-per-use model for enabling convenient, on-demand network access to a shared pool of configurable and reliable computing resources (e.g., networks, servers, storage, applications, services) that can be rapidly provisioned and released with minimal consumer management effort or service provider interaction.”

Need for Cloud

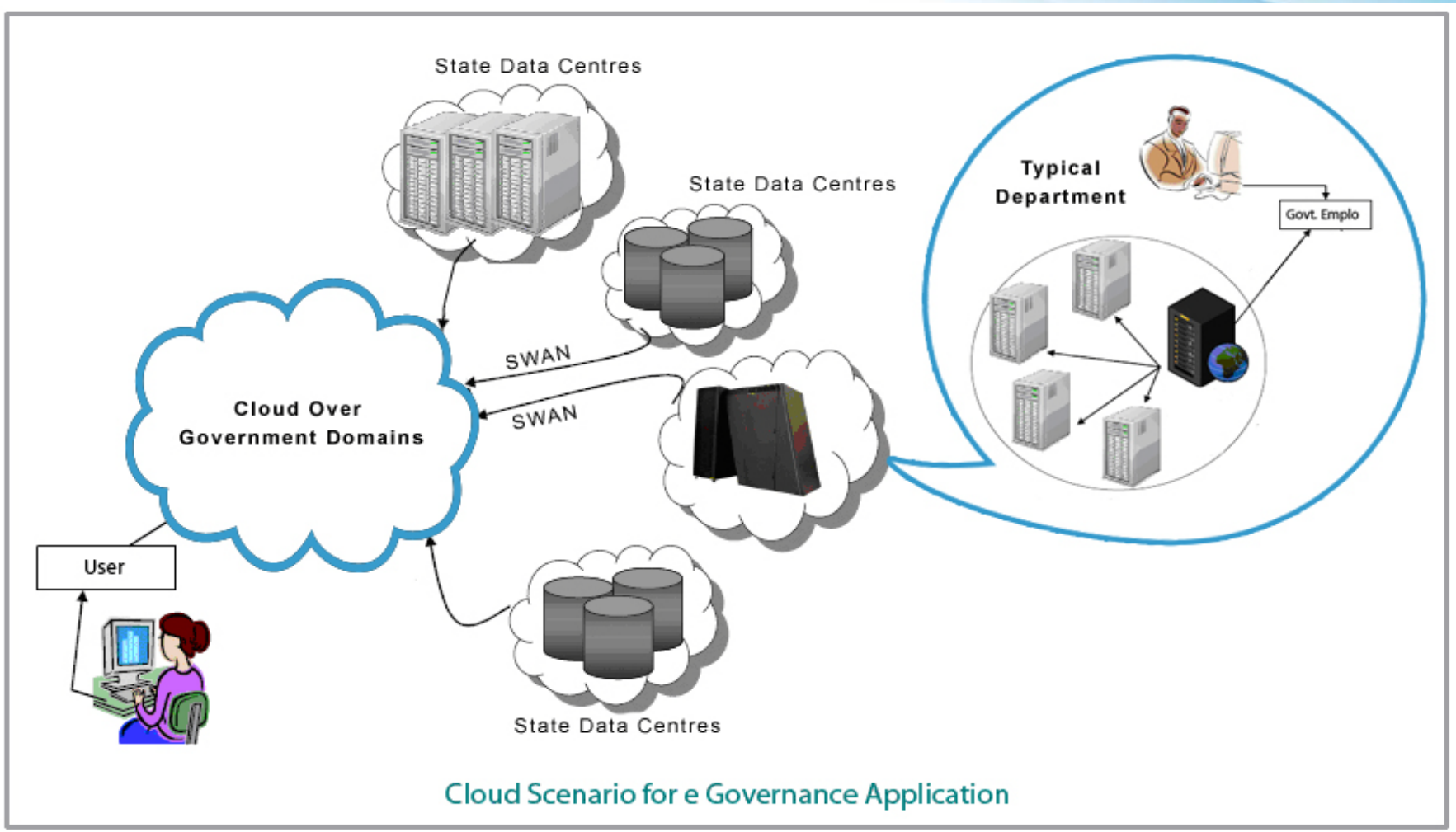
- need of scale and reach of IT infrastructures has been a limiting factor for governments.
- the governments' ability to deploy more applications is limited by its capacity to create more Datacentres
- Cloud help governments ensure IT needs of department are disbursed in the form of computing capacity not in the form of budgets.

US IT analyst firm McKinsey & Co estimated that "if an organization could consolidate servers and keep the operational costs of the resulting data center to $45 per month per CPU, it could enjoy this computational power at a rate that would be less expensive than the cost of running operations on, say, Elastic Compute Cloud".

Benefits

- Green IT
- Turns Capital Expenditure (CapEx) into Operational Expenditure (OpEx)
- Utility billing : pay for use
- responsive delivery of services
- higher service quality
- services to users “on demand”

National e-Governance Plan (NeGP) and Cloud



Cloud Scenario for e Governance Application

Cloud services

- Computation, Storage service (IaaS)
- Cloud Platform service (PaaS-Cloud images)
- Software service (SaaS)
- Data service
- Billing, Management and Maintenance service
- Content delivery service

Functional requirements

- Self servicing Portals
- Dynamic Business rules and SLA Management
- Multi tenancy & Workflow management
- Security – Data, Physical, network, Application
- Monitoring, Maintenance & Ubiquitous network access
- Rapid elasticity & Virtualization
- Automated dynamic provisioning, Automated reservations and scheduling

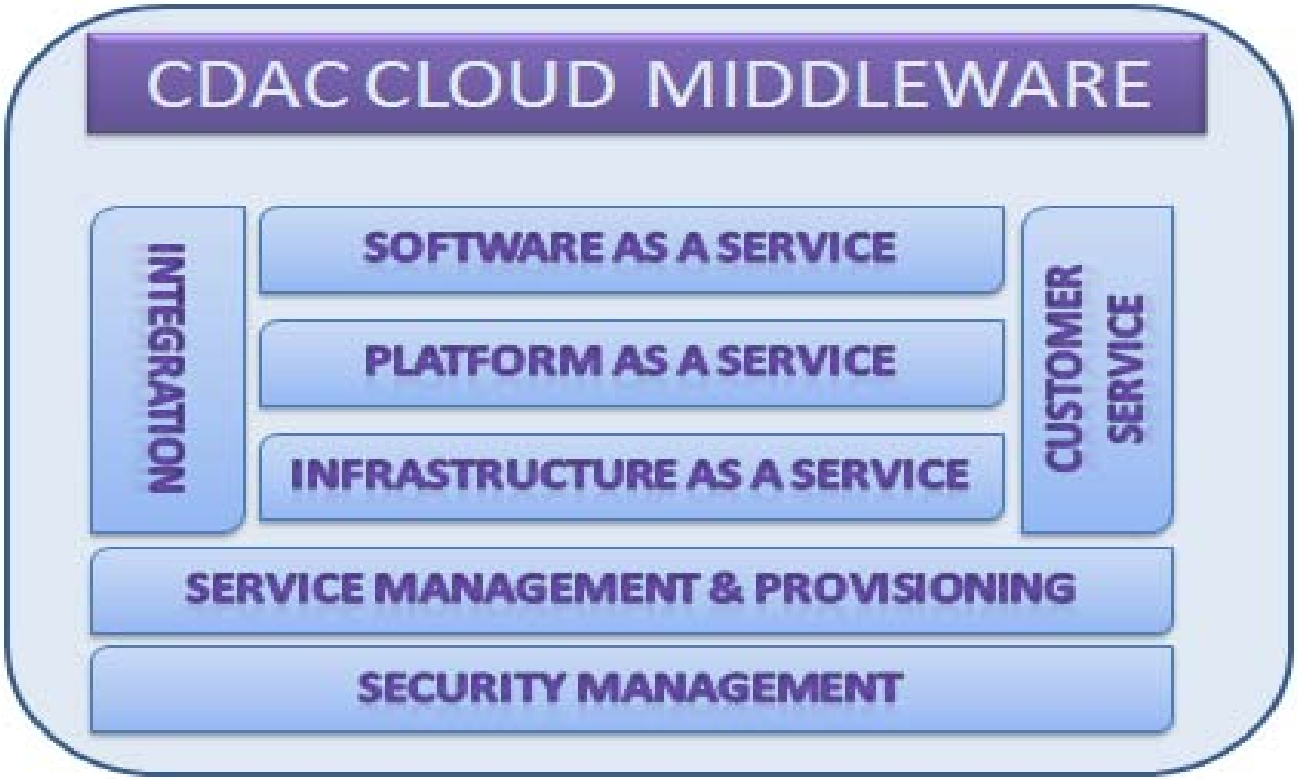
Open source and Cloud

- Licenses permit and encourage redistribution that leads to R&D
- Architecture enables programs be used as components where-ever possible
- Open-standards, interoperability, flexibility
- Multi-lingual support
- Lowered barriers to adoption
- Data mobility

Cloud Middleware tools

Tool	*Provisioning Model*	*Default Placement Policies*	*Configurable Placement Policies*
Amazon EC2	Best-effort	Proprietary	Proprietary
VMWare DRS 3.0	Immediate	Initial placement based on CPU load, and dynamic placement to balance average CPU or memory load and to consolidate servers	No
Platform Orchestrator	Immediate	Initial placement on CPU load and migration policies based on policy thresholds on CPU utilization level	No
Nimbus	Immediate	Static greedy resource selection	No
Eucalyptus	Immediate	Static cyclic placement	No
Enomaly Computer Platform	Immediate	Static placement based on attributes	No
Ovirt	Immediate	Manual mode	No
OpenNebula 1.2	Best-effort	Initial placement based on a requirement/rank policies to prioritize those resources more suitable for the VEE using dynamic information, and dynamic placement to consolidate servers	Support for any static/dynamic placement policy
OpenNebula 1.2/ RESERVOIR	Immediate, Best-effort	Load balancing, and power saving policies	Support for policy-driven probabilistic admission control and dynamic placement optimization to satisfy site-level management policies
OpenNebula 1.2/ Haizea	Immediate, Best-effort, Advanced reservation	Dynamic placement to implement advanced reservation leases	VEE placement strategies supporting queues and priorities

Middleware Development



Multi-lingual Support

Developer

1

Property File

```
login.userName = UserName
login.password = Password
login.centreName = CDAC Centre
userLogin.IncorrectLogin = Incorrect User Name and/or Password
```

3

Encoded File

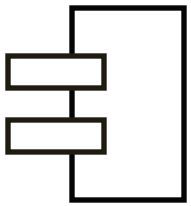
```
l                aa\u0baf\u0ba9\u0bb0\u0bcd \u0baa\u0bc6\u0ba
l                95\u0b9f\u0bb5\u0bc1\u0b9a\u0bcd\u0b9a\u0bca
login.centreName = CDAC \u0b9a\u0bc6\u0ba9\u0bcd\u0b9f\u0bb0\u0bc
userLogin.IncorrectLogin = \u0ba4\u0bb5\u0bb1\u0bbe\u0ba9 \u0baa\
```

Translator

2

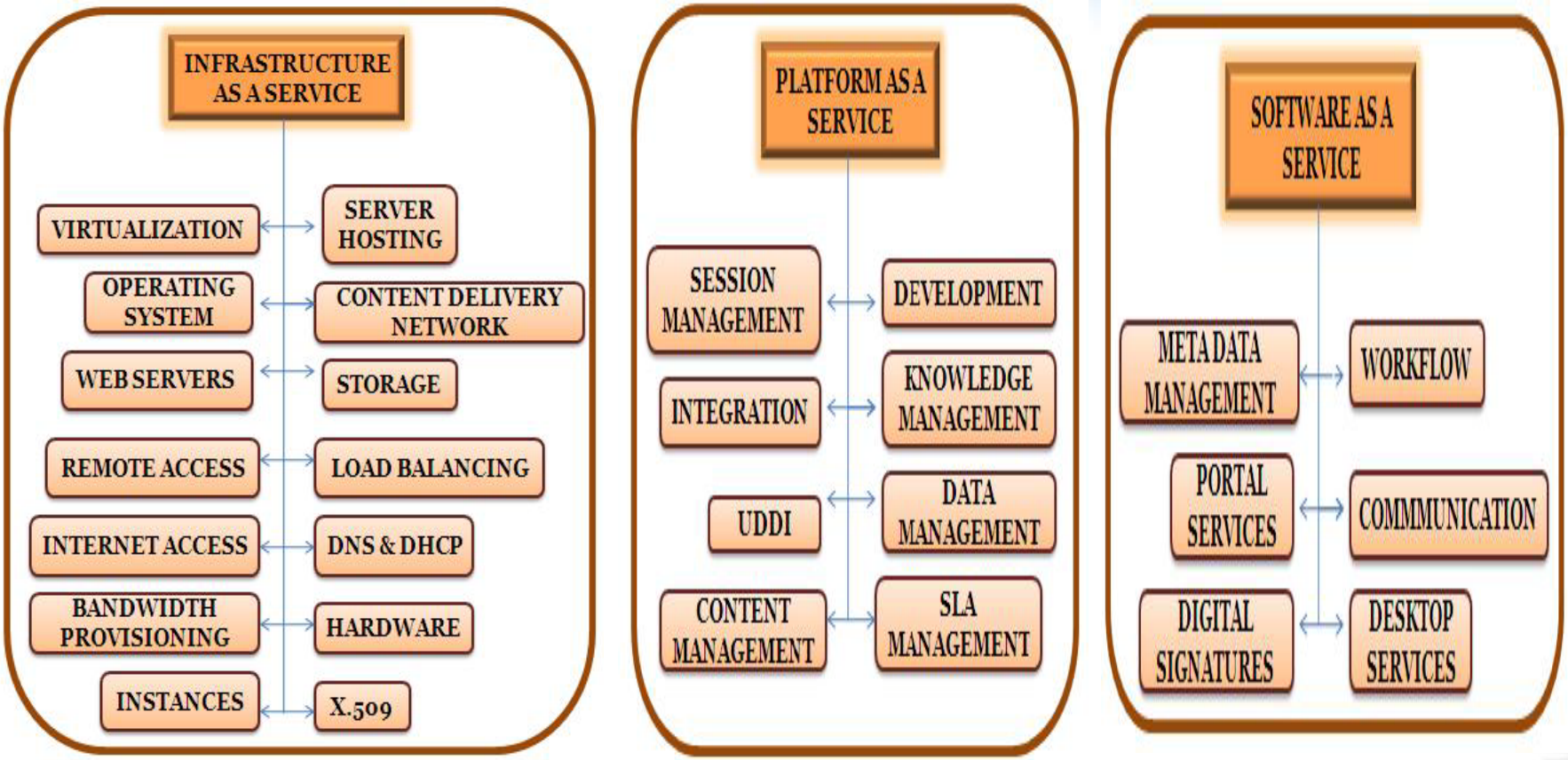
Translated File

```
login.userName = பயனர் பெயர்
login.password = கடவுச்சொல்
login.centreName = CDAC சென்டர்
userLogin.IncorrectLogin = தவறான பயனர் பெயர் மற்றும் கடவுச்சொல் Incorrect
```

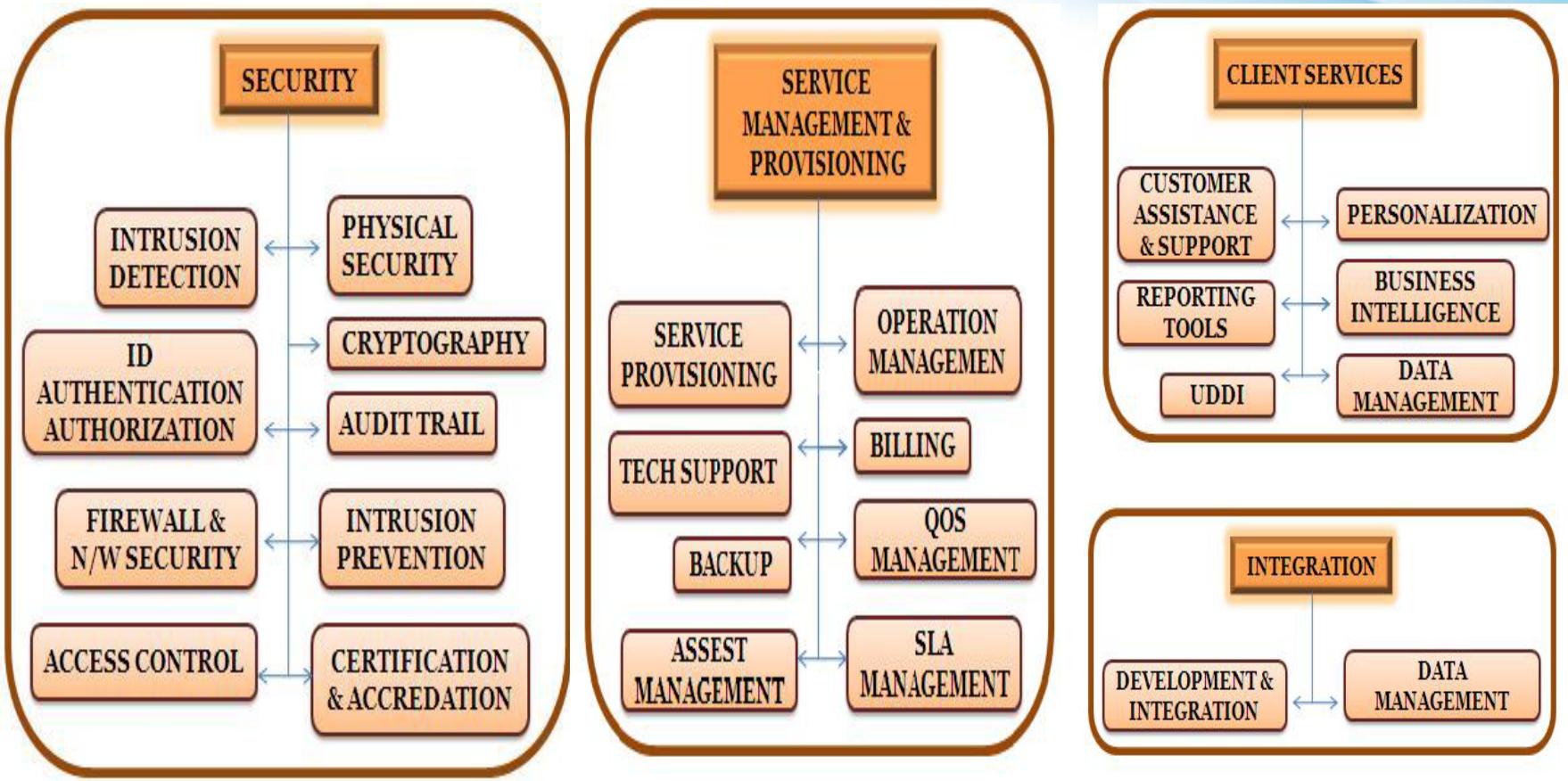


Unicode Utility

Middleware Development



Middleware Development…



Thank You