IT Services Architecture

Module 10

Broad Architecture

- Recent focus has been on IT components
  - Operating Systems (Module 6)
  - Networking (Module 7,9)
  - Network Services (Module 8)
- Combined these components and others form the broad architecture of an IT environment.

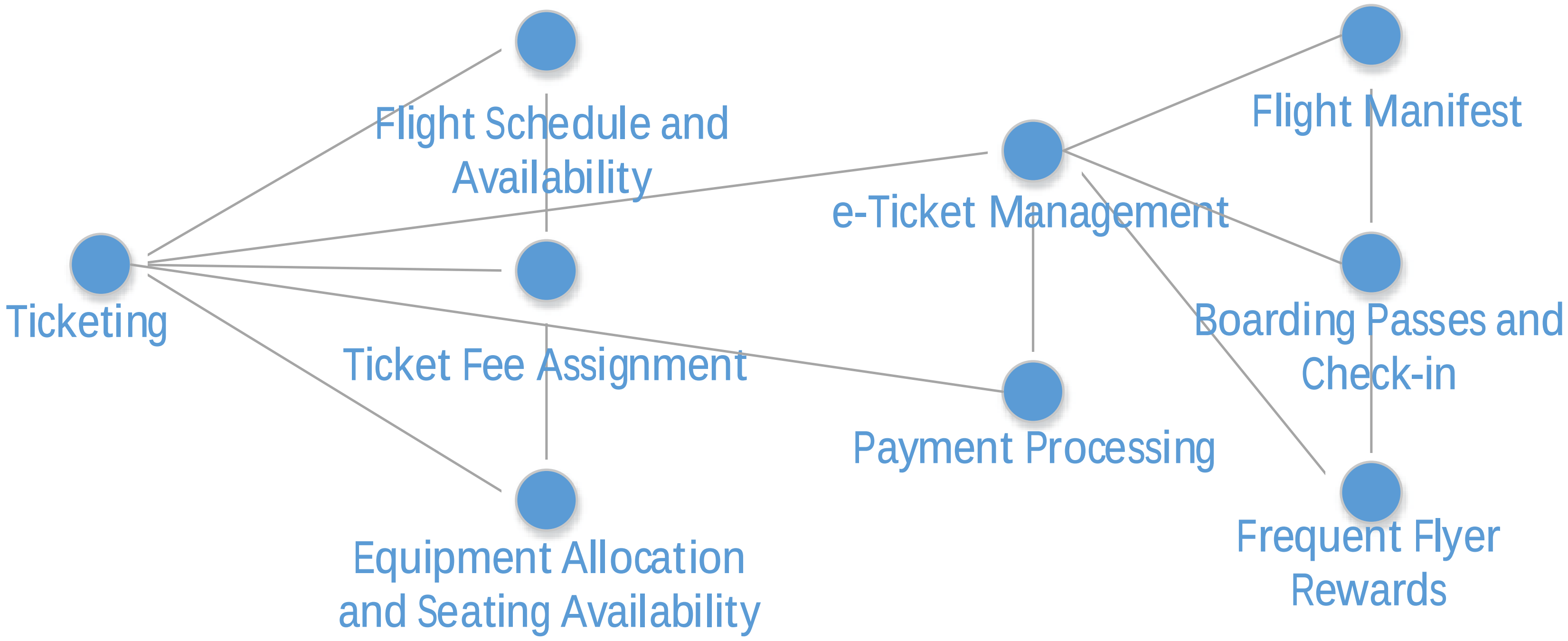
Composite

- Interdependencies exist:
  - Within each service stack (ex. HW, OS, Applications, Networking)
  - Between services
    - Pervasive examples:
      - DHCP for client networking
      - DNS within most networking contexts
      - Internet enabling access to customer applications or employee productivity
      - Centralized authentication and authorization (ex. Microsoft Active Directory) used by domain member servers

Composite

- Mission driven example:
  - Airline ticketing site depends on:
    - flight schedule and availability service,
    - ticket fee assignment service,
    - equipment allocation and seating availability service,
    - frequent flyer rewards program service,
    - e-ticket generation and management service,
    - payment processing service,
    - boarding passes and check-in service,
    - luggage logistics,
    - flight manifest,
    - flight connection logistics,
    - food and beverage service logistics

Composite


Flight Schedule and Availability
Flight Manifest
e-Ticket Management
Ticketing
Ticket Fee Assignment
Boarding Passes and Check-in
Payment Processing
Equipment Allocation and Seating Availability
Frequent Flyer Rewards

Points of View

- Infrastructure View
- Systems View
- Services View
- Dataset View
- Personnel View

Focus

- Infrastructure View
  - Core & Edges
  - Zones or Security Domains
  - Development – Test - Production
- Systems View
  - Service components allocation
  - Services components collocation
  - Physical and Virtual systems

Infrastructure View

- Infrastructure – Pervasive technology that facilitates other IT services or is used by people directly.
- Core & Edges
  - A network centered view
  - Core are technologies that are centralized to a minimal number of physical copies
    - Core can refer to technology management in the hands of limited set of personnel

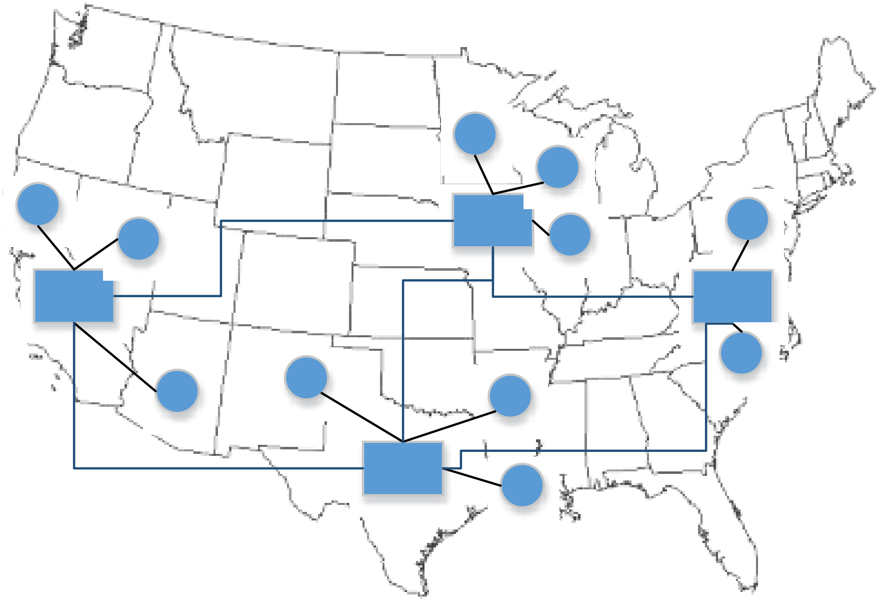
Infrastructure View

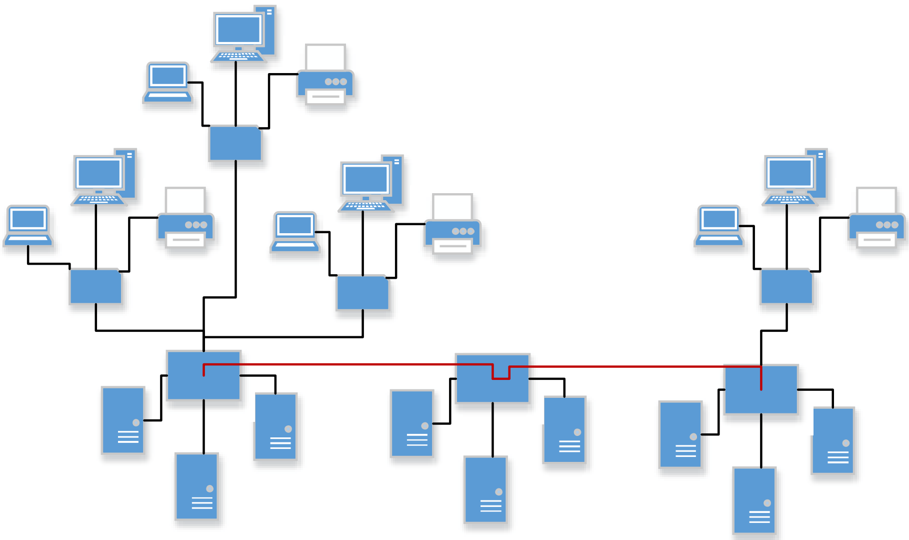
- Core technology can be distributed geographically
  - Location is in part determined by resource demand
    - Network technology bridges the physical and virtual worlds
    - Network technology options and performance are affected by distance
    - Large capacity devices/systems are placed in locations where demand is concentrated

Infrastructure View

- Edge technology is commonly located at the periphery of the environment
  - – User devices or client software
  - – Services used by a workgroup or small number of people
  - – Services provided to external users or partners
  - – Technology that enable services provided by vendors

Core and Edge





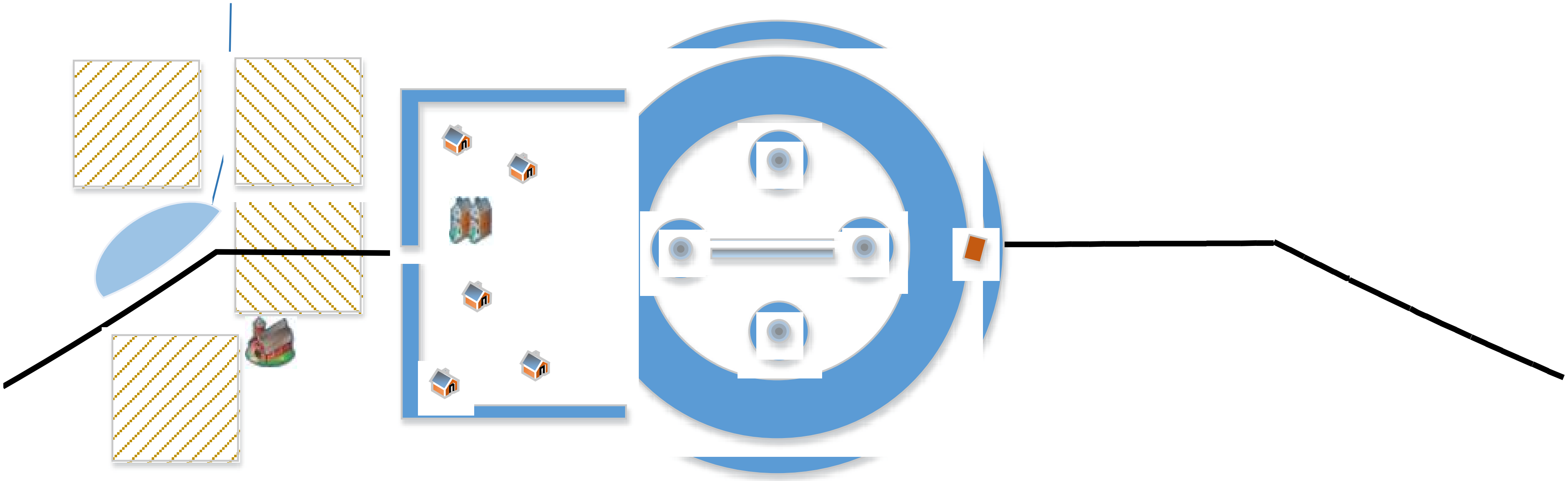
Zones and Security Domains

- Compartmentalization
  - Limit resources within a compartment to what is necessary.
  - Limit who has access to the compartment to those who needed it.
  - Limit access between compartments and be able to isolate when necessary

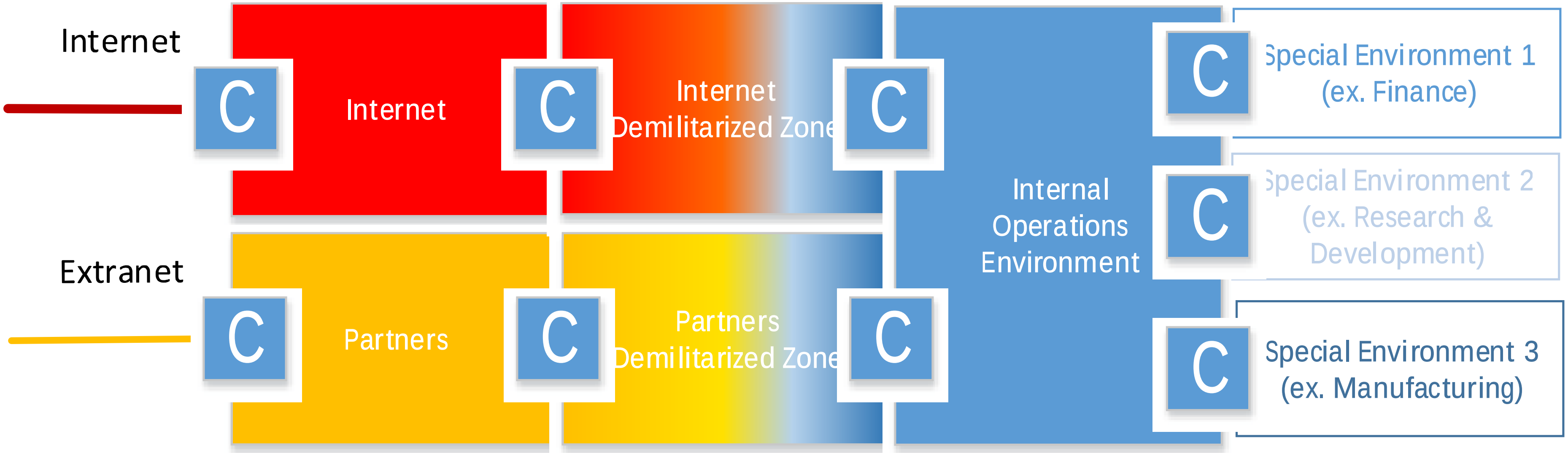
Zones and Security Domains

- Security Domains or Realms
  - A logical collection of resources accessible by a user population and administered by a specific team/organization
  - Distinctions are made between security domains based on:
    - Who administers the resources
    - Policies and practices implemented
    - Who uses or has access to the resources
    - Sensitivity, value and purpose of the resources
  - Trust between domains must be carefully considered

Zones an Security Domains



Zones and Security Domains


Internet
Extranet
C
Internet
Internet Demilitarized Zone
Partners
Partners Demilitarized Zone
Internal Operations Environment
Special Environment 1 (ex. Finance)
Special Environment 2 (ex. Research & Development)
Special Environment 3 (ex. Manufacturing)

Development – Test - Production

- Organizations with in-house software development have three nearly identical environments
  - New software is developed in the Development environment
  - Software testing occurs within the Test environment
  - Deployed software on which the organization depends for operations is located in Production

Development – Test - Production

- Developers tend to be restricted from deploying software in either Test or Production environments
  - Testers are restricted from deploying software in Production
- Datasets used for development are conceptually equivalent with production, but data are fictitious.
  - Testers may use copies of real data if necessary

Systems View

- Service Components Allocation
- Services Components Collocation
- Physical vs. Virtual Systems

Service Components Allocation

- Complex services consist of multiple software modules
  - Web applications are commonly designed with 3 tiers
    - Web server – interacts with web client
    - Application server – middleware that applies business logic, dynamically constructs web pages, interacts with database
    - Database – maintains the data records and the controls access to those records

Service Components Allocation

- This view depicts service dependencies upon system elements (computers, network, storage)
  - System in this context can consist of multiple independent or clustered computers
- Component allocation can be shaped by:
  - Performance and Availability requirements
  - Acceptable exposure of component in terms of threats
  - Operating and licensing costs
  - Supported platform (OS + HW) and available skilled labor to support it

Services Components Collocation

- This view identifies how and where services share common system elements
  - Two services can be co-dependent upon common technology or administration
    - Problems with the common technology or administration will affect service operations for services that may be logically unrelated.
      - Common technology could be the same computer, network segment/router/firewall or storage device

Service Components Collocation

- Why collocate modules from different services?
  - Cost
    - Modules may not be sufficiently busy to merit a dedicated technology element
    - More hardware means more heat, power use, cooling, space, maintenance, network ports, cabling, larger backup power supply
    - Labor efficiency through convenience and fewer variations of platform (HW, OS + patches)

Component Allocation and Collocation

- These two views are complementary and can be combined
  - A strict component collocation view would not be very informative

Physical vs. Virtual

- View is very similar to the other system views
- The emphasis is on knowing more about the computing platform on which services components reside
  - Logical systems diagrams can hide platform details
  - Virtualization servers have been called “data centers in a box”

Physical vs. Virtual

- Cloud computing and virtualization management software can be physical platform identification nearly impossible.
  - Load balancing and fault tolerance mechanisms can move virtual machines to one of many virtualization hosts
  - You are dependent others or management software to ensure your virtualization performs adequately in a reasonably safe environment.

Physical vs. Virtual

- Knowing what actual platforms are hosting a service is useful:
  - Problems visible in a service may require physical access to correct
  - Knowing where the service is hosted helps with locating the people who can help
  - Location security is important to service security.
    - Physical access to a system can undermine most security in OS, application and network.