

Internet Accounting, Billing and User Management

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Format of Talk

- ◆ Feel free to interrupt
- ◆ Content Matter:
 - ◆ Jet
 - ◆ CQU's Implementation
 - ◆ Other implementations
 - ◆ General Question and Answer throughout

Jet – The Billing System

- ◆ Internet billing system - ISP-originated
- ◆ Built/Supported in Australia
- ◆ Scalable, Flexible, Platform Independent*
- ◆ Open Source/Source Available
- ◆ Python/Zope

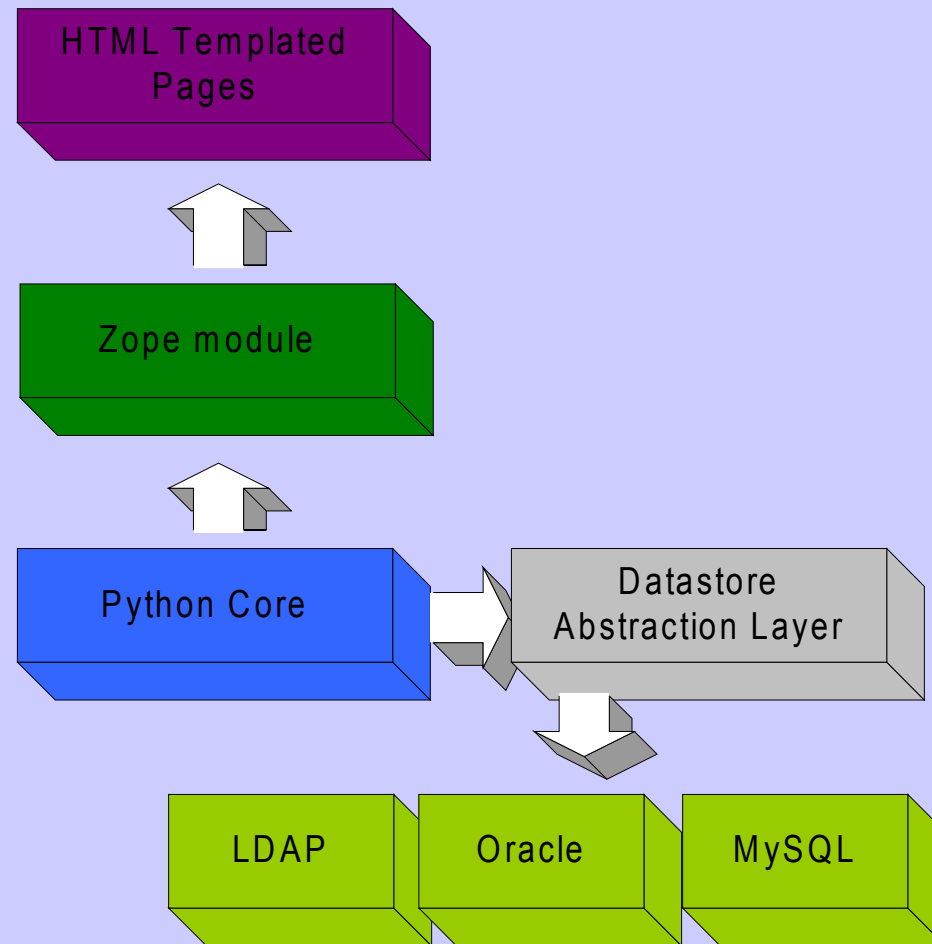
What does Jet do?

- ◆ Usage collection, assigning to users
- ◆ Rating
- ◆ Billing, invoicing, credit card transactions
- ◆ User tools for account management
- ◆ Admin tools for system management
- ◆ HTTP and CLI interfaces

What doesn't Jet do?

- ◆ Helpdesk
- ◆ Financials

Code Structure



Breakdown of Challenges

- ◆ Authentication/Access Control
- ◆ Usage Collection
- ◆ Assigning Usage to Users
- ◆ Rating
- ◆ Billing – Invoicing and Receiving Payments
- ◆ Tools – user and admin

University Features

- ◆ What's different about Universities?
 - ◆ Departmental billing
 - ◆ Quotas vs. purchased credit – timeouts
 - ◆ Different mix of client systems – fixed PCs etc

Authentication/Access

- ◆ Limited Methods:
 - ◆ RADIUS
 - ◆ SSG
 - ◆ Proxy Login
 - ◆ LDAP-driven systems (eg. eduPerson)

Forcing Authentication

- ◆ Captive Portal systems, ala wireless
- ◆ SSG or equivalent
- ◆ RADIUS/NASes
- ◆ Fixed IP allocation

Cost Analysis

- ◆ Various Methods, again:
 - ◆ SSG
 - ◆ RADIUS
 - ◆ Netflow
 - ◆ NetraMet-style “sniffing”
 - ◆ Proprietary/direct to database

High Speed Links

- ◆ Separation of Tasks
 - ◆ Collection separated from billing
 - ◆ Aggregation done pre-billing where possible
 - ◆ These tools are “part of” Jet, but not tied to the central Jet server
 - ◆ Thus, independently scalable.

Central Server Scalability

- ◆ Back-end database can be scaled
- ◆ Main server can be replicated
- ◆ “Spin-off” read-only servers can be run
- ◆ LDAP interfaces, Oracle interfaces

Usage Data Commonality

- ◆ Usage in different formats – CDR, Radius, Flowusage, photocopy machines, etc.
- ◆ Falls into a base format:
 - ◆ start_time
 - ◆ end_time
 - ◆ User identification
 - ◆ Units in
 - ◆ Units out
 - ◆ Classification (on-net vs. off-net)

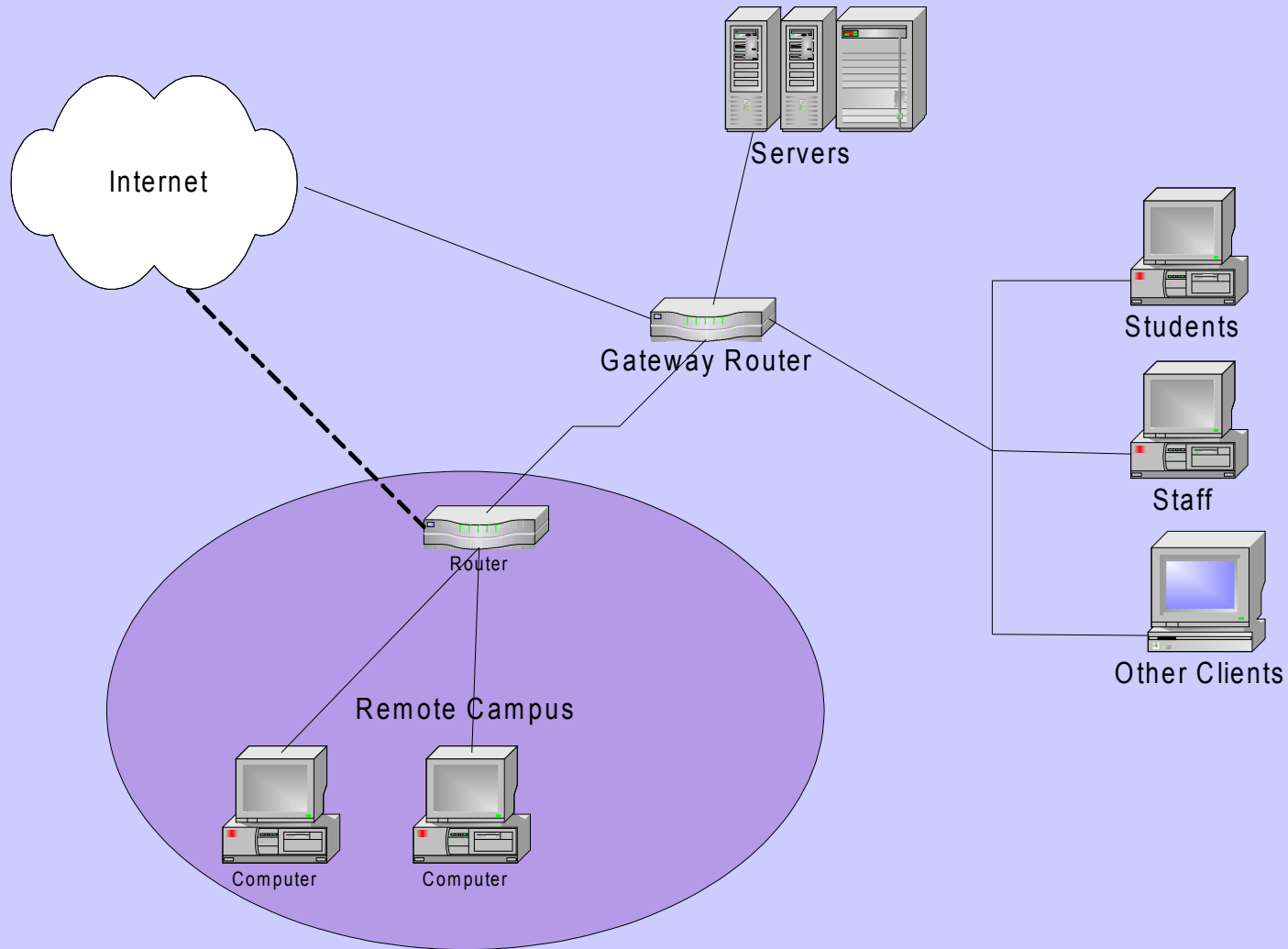
Scalability

- ◆ RADIUS – good for dialups and wireless
- ◆ Sniffing – the poor man's netflow
- ◆ Netflow – good for medium-sized controlled networks
- ◆ SSG – good for scaling up to larger Universities
- ◆ Proprietary solutions?

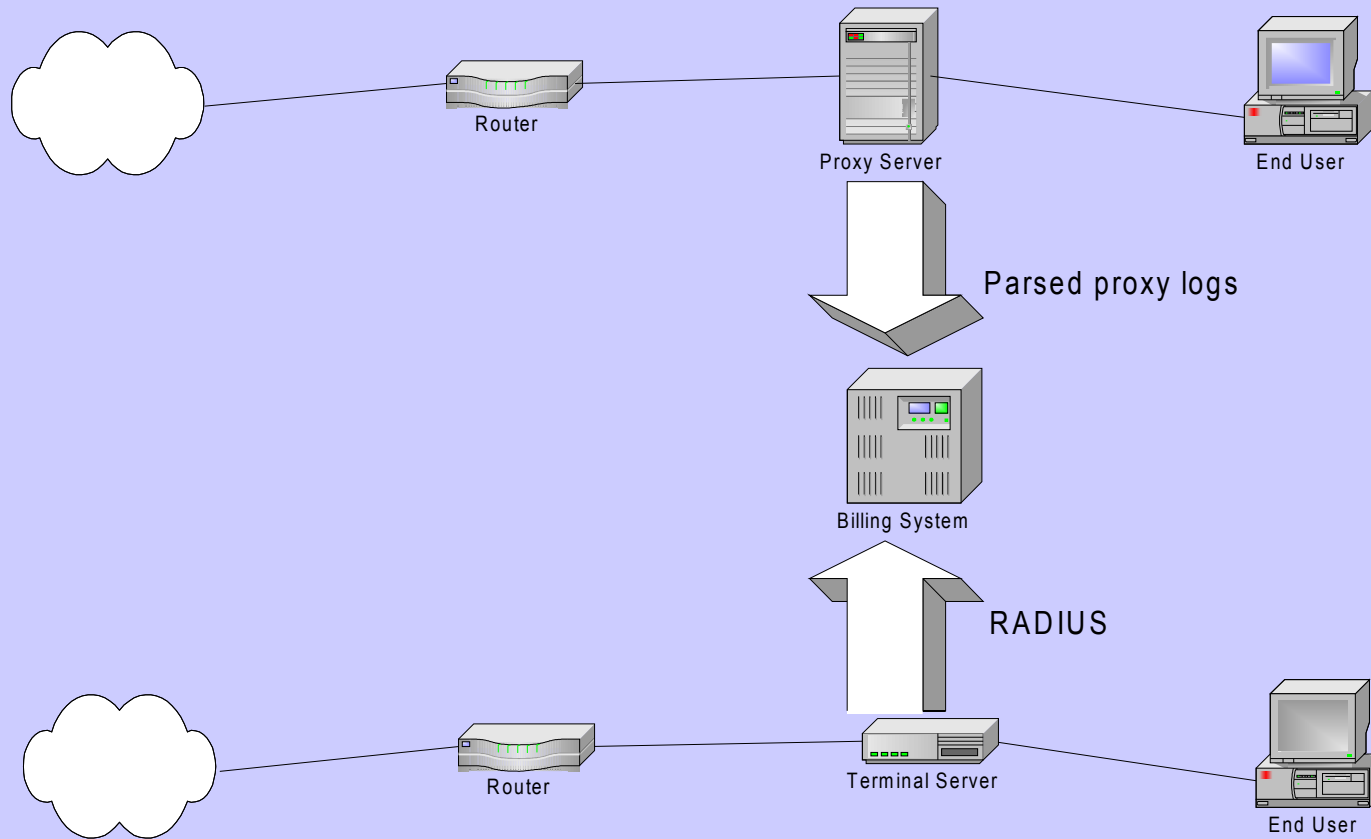
Network Design/Layout

- ◆ Particularly important for Netflow/SSG
- ◆ Collectors at strategic points
- ◆ Collation/aggregation of data
- ◆ Filtering based on traffic paths/duplicate management

Typical Network Layout



Data Collection Methods



Graceful Fallback

- ◆ What happens when links disappear?
 - ◆ Routing changes
 - ◆ Rating requirements may change
 - ◆ Signalling to billing system...

Basic Layout Rules

- ◆ Collect as near to either edge as possible
- ◆ If Netflow, run collectors near the routers
- ◆ Split collection and aggregation/assigning
- ◆ Clearly defined traffic paths
- ◆ Can't count what you can't see
- ◆ Try not to mix collection types

Assigning Usage to Users

- ◆ Split collecting from assigning:
 - ◆ Scalability
 - ◆ Replayability
 - ◆ Other uses of data – network monitoring

What can you bill?

- ◆ Data:
 - ◆ SSG
 - ◆ Netflow
 - ◆ Etc
- ◆ Voice
- ◆ Web usage
- ◆ Photocopiers
- ◆ Coke Machines
- ◆ ...

Rating

- ◆ Plan Definition
- ◆ Quotas
- ◆ Automatic Adjustments
- ◆ Departmental Management
- ◆ Historical/Replayability/Testing

Plan Complexity

- ◆ Universities “a different kind of complex”
- ◆ Quotas vs. plans
- ◆ Less complexity per plan, more complexity per user

Billing

- ◆ End user vs. departmental – hierarchies
- ◆ Invoice generation
- ◆ Online vs. Offline payment
- ◆ Photocopy cards
- ◆ Prepaid vs. Postpaid (or mix)

Tools for Users and Management

- ◆ All web-based
- ◆ CLI/code level equivalents
- ◆ Web pages skinnable per (realm/device/etc)

Other Issues

- ◆ Plans based on dollars vs. quota:
 - ◆ Cut-off times
- ◆ Interfaces for mid-session cut-offs:
 - ◆ Cisco's upcoming “iEdge”
 - ◆ COPS
 - ◆ Others proprietary