Shared Data and Peer-to-Peer Patterns

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WEEK 4-1

Shared-Data Context

Various computational components need to share and manipulate large amount of data

This data does not belong solely to any one of those components

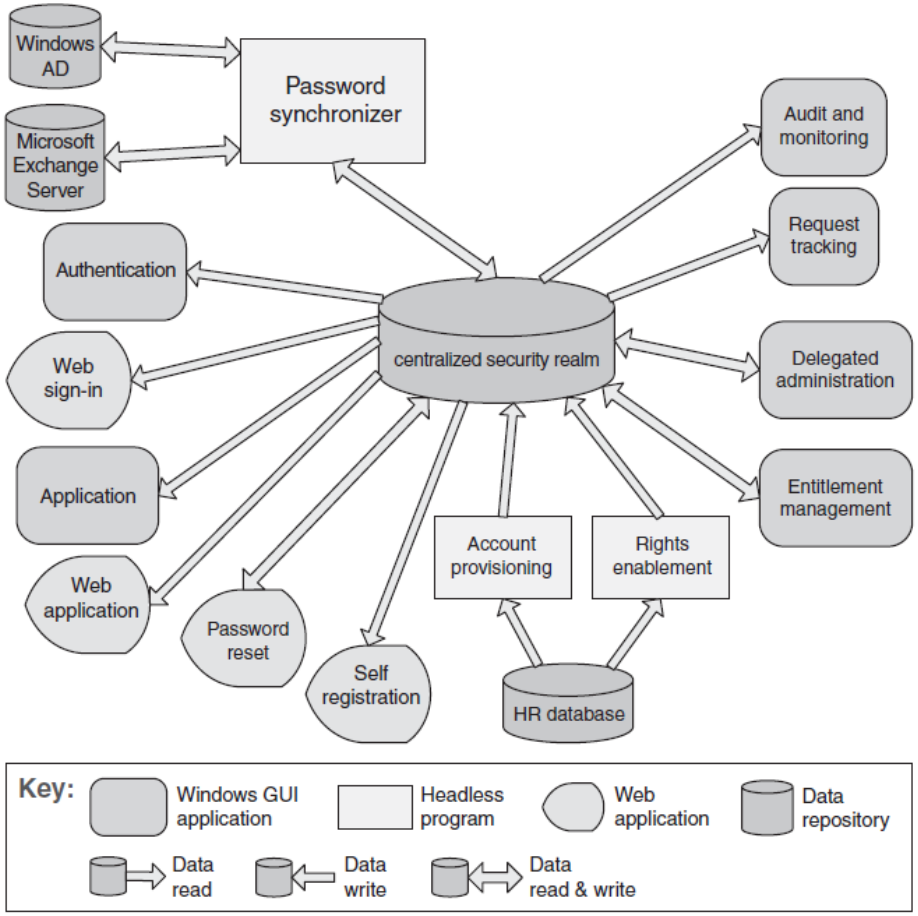
Shared Data Pattern

The data store provide shared access to data to multiple accessors

Mange concurrency through transaction management

Provide fault tolerance and support for access control

Shared Data Pattern



Shared Data Pattern

Limitations

- The shared data may be a performance bottleneck
- The shared data store may be a single point of failure

Advantages

- Decoupling of producers from consumers
- Redundancy for availability and performance

Peer-to-Peer Context

Need distributed computational entities that are considered equals

Need to cooperate and collaborate to provide a service to a distributed community of users

Achieve high availability and scalability

Peer-to-Peer Pattern 1/2

Change client-server architecture such that all participating entities are both client and server

Resources are shared across all peers

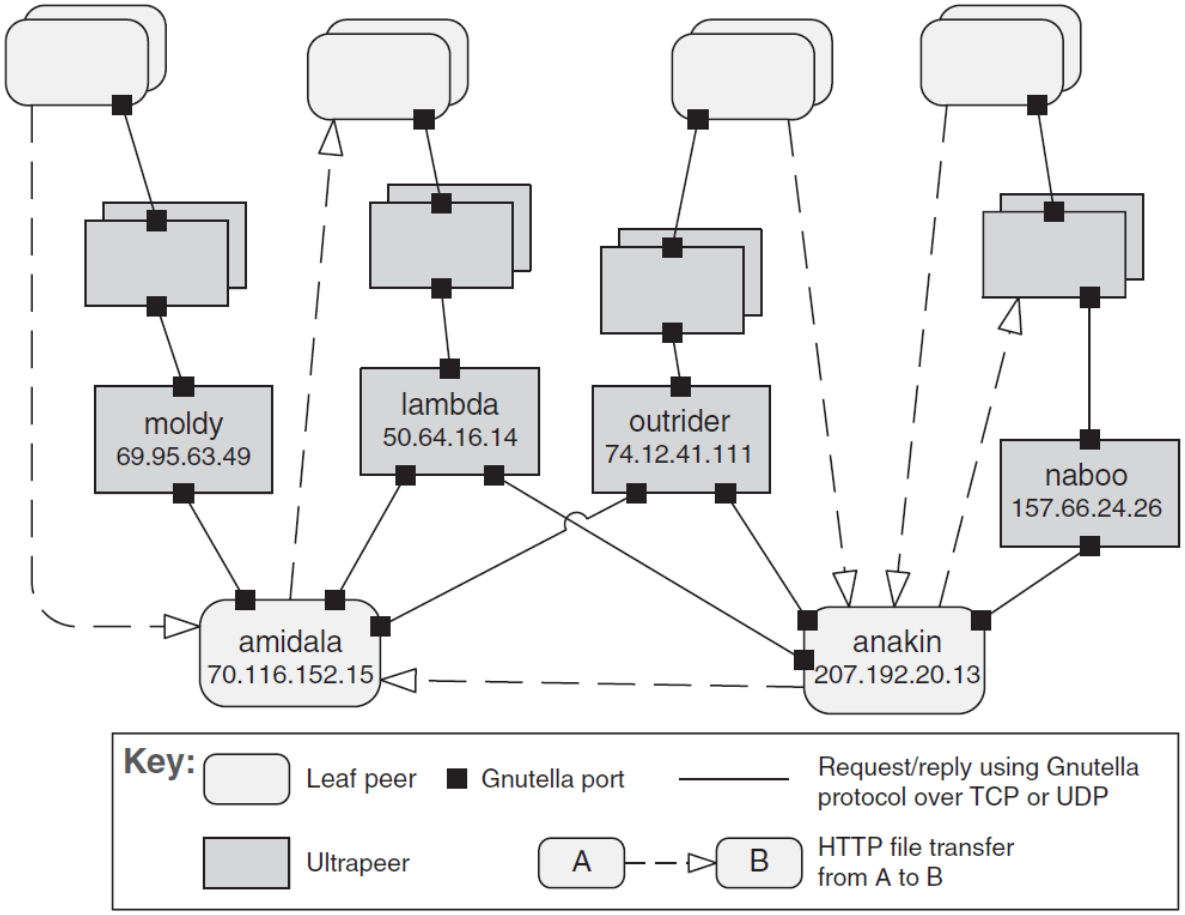
No peer are critical for the health of the system

Peer-to-Peer Pattern 2/2

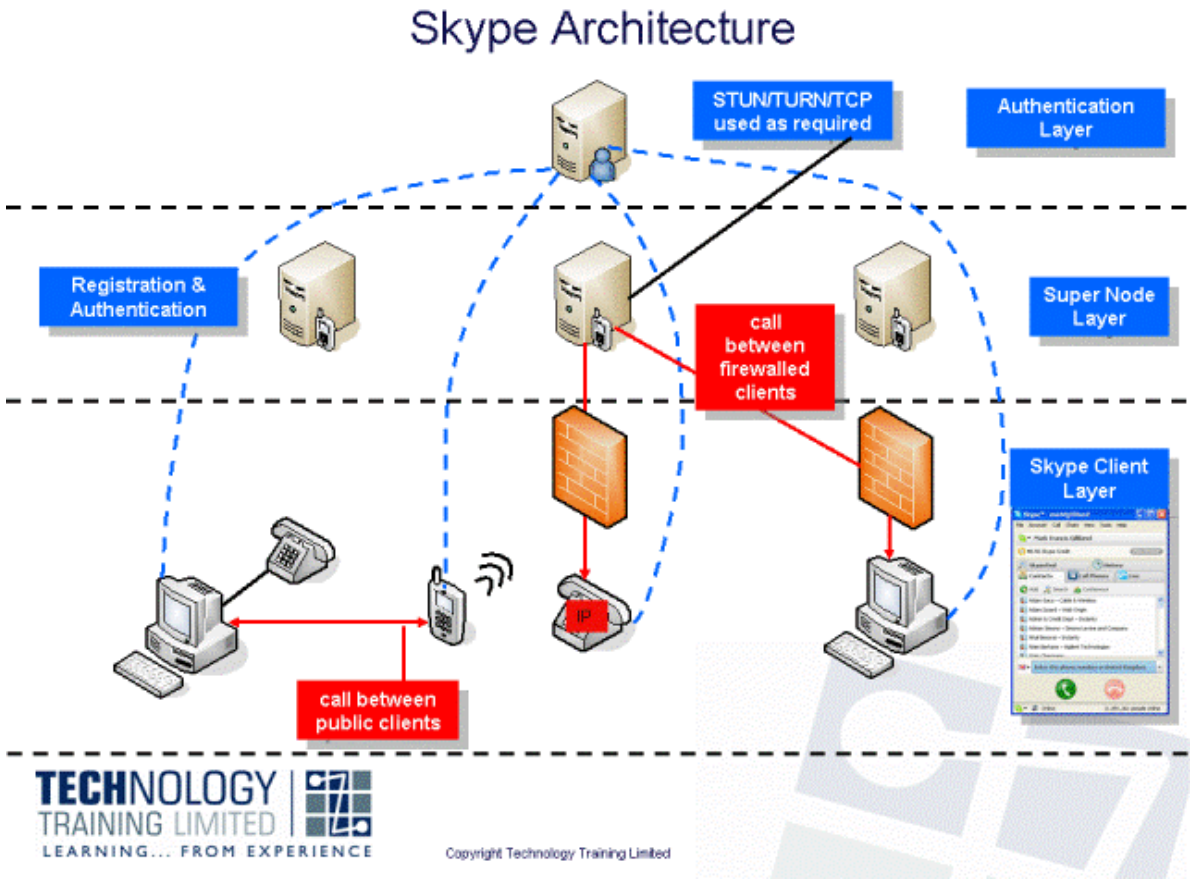
Overlay network, discovery, hops, join/leave group

Load balancing techniques, e.g. virtual coin

Architecture of Gnutella



Architecture of Skype



http://www.technology-training.co.uk/skypesroadmapandarchitecture_28.php

Further Reading

Learning from Five Years as a Skype Architect by Andres Kutt

https://www.infoq.com/articles/learnings-five-years-skype-architect

Constraints

The number of allowable attachments

The number of hops used for searching for a peer

Which peers know about other peers

Limitations

Managing security, data consistency, data/service availability, backup and recovery are all more complex

Small P2P may not be able to consistently achieve performance and availability goals

Some Challenges for P2P

Upstream		Downstream		Aggregate	
BitTorrent	18.37%	Netflix	35.15%	Netflix	32.72%
YouTube	13.13%	YouTube	17.53%	YouTube	17.31%
Netflix	10.33%	Amazon Video	4.26%	HTTP - OTHER	4.14%
SSL - OTHER	8.55%	HTTP - OTHER	4.19%	Amazon Video	3.96%
Google Cloud	6.98%	iTunes	2.91%	SSL - OTHER	3.12%
iCloud	5.98%	Hulu	2.68%	BitTorrent	2.85%
HTTP - OTHER	3.70%	SSL - OTHER	2.53%	iTunes	2.67%
Facebook	3.04%	Xbox One Games Download	2.18%	Hulu	2.47%
FaceTime	2.50%	Facebook	1.89%	Xbox One Games Download	2.15%
Skype	1.75%	BitTorrent	1.73%	Facebook	2.01%
	69.32%		74.33%		72.72%

sandvine

2016 Top 10 Peak Period Applications in North America

Next

Concepts (After Holidays)

- DevOps

Things Due

- Paper Review 2 – Due by 11:55 pm, Wednesday, Jan 4
- Lab 5 – Due by 11:55 pm, Thursday, Jan 5