

Will Clouds Reign? A Stormy Future for Pure-play Communications

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Agenda

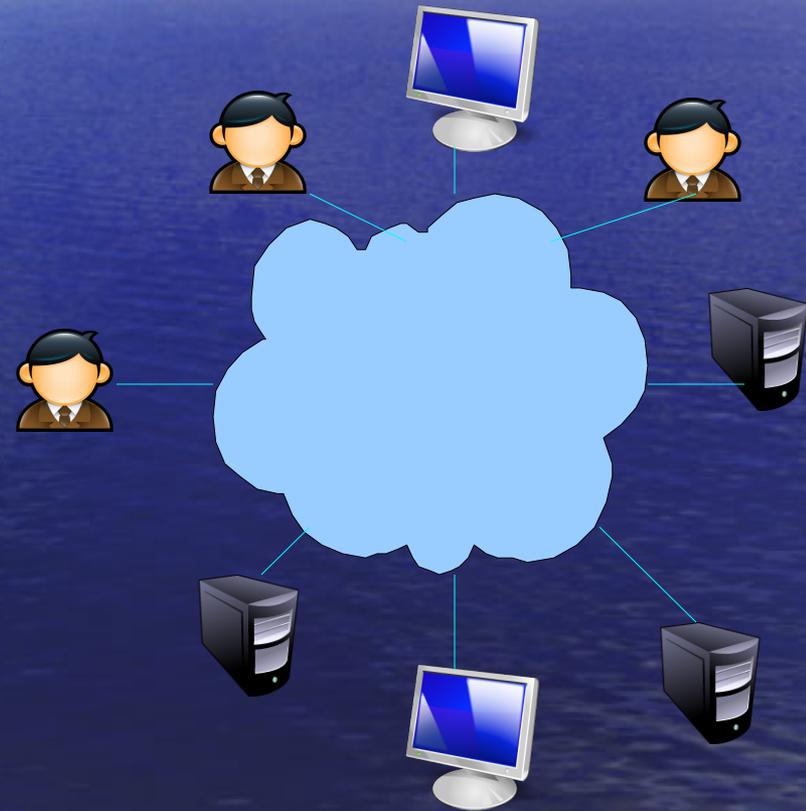
- Infrastructure is for *applications*
- Clouds: Distributed *Computing*, 30 years late (Liquidity)
- Mobility and Clouds
- People and Clouds
- Business and Clouds

Infrastructure is for *applications*

- What applications are best served by network businesses and business models?
 - Conversations
 - Broadcasts
 - Remote Access to distant resources
- What are the emerging applications?
 - Locating relevant information
 - Augmenting the users' environment

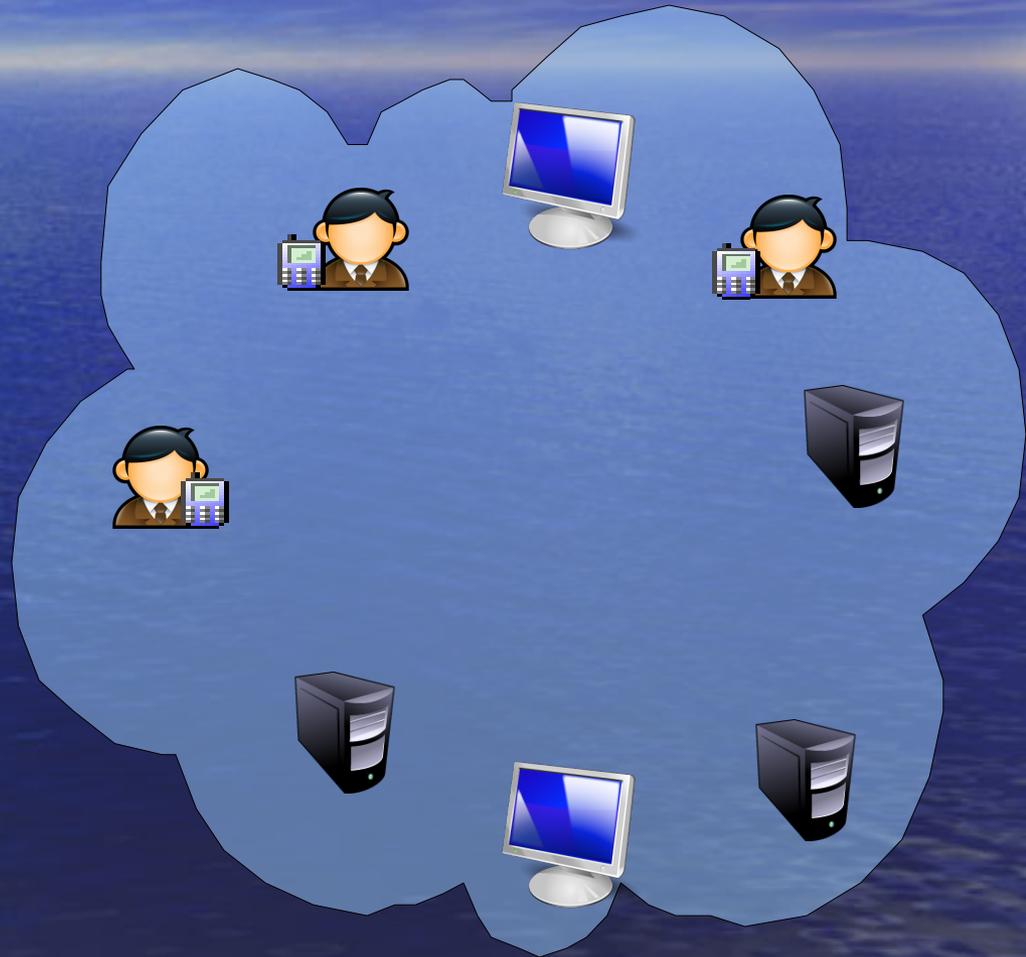
Tradition: connectivity platform

- Tele- is the problem to solve
- Resources are fixed – servers, people, content
- Transporting bits faster, farther, cheaper



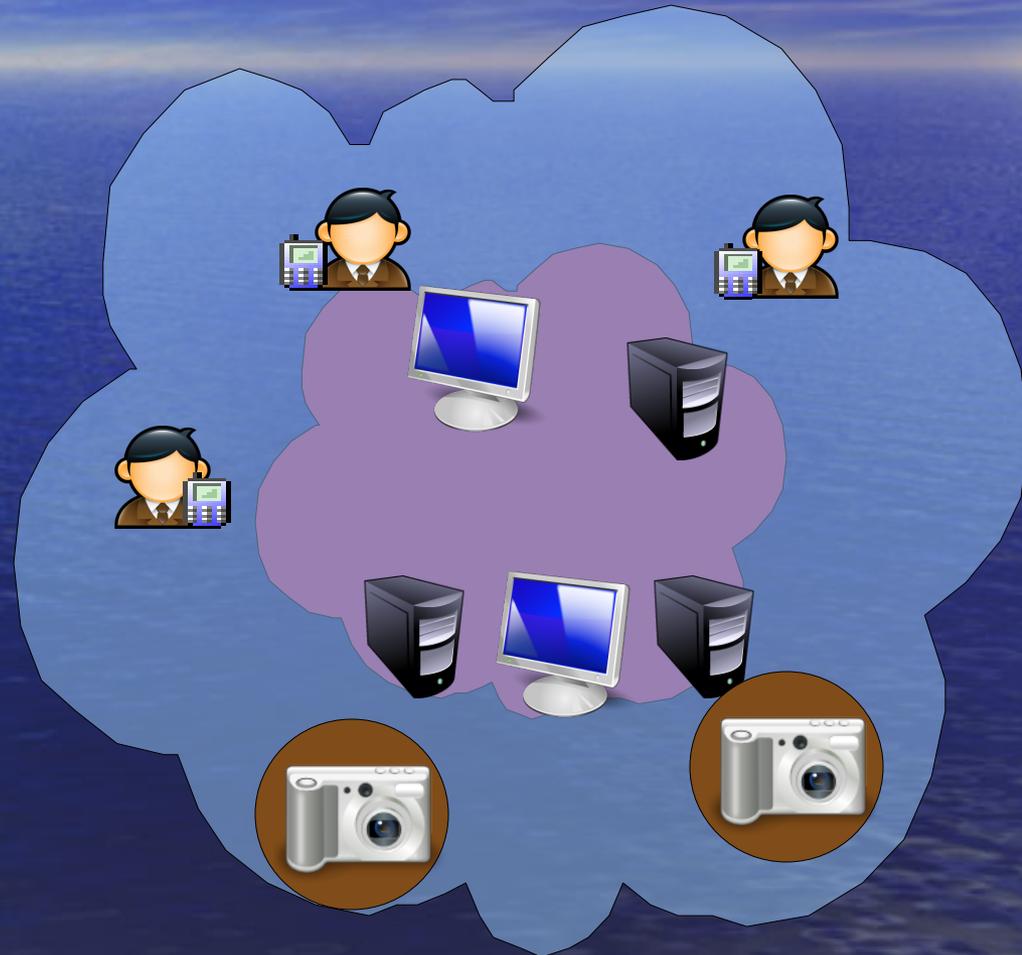
Hypermediated applications

- Web 2.0
 - Mashups, YouTube
- Social networking
 - Facebook
- MMORPG
 - Blizzard Games
- Online Collaboration and Simulation
 - Second Life, Croquet
- Augmented reality
 - Mscapes, Smart cars



Distributed *computing*, Thirty years late

- Location
- Identity/Relation
- Privacy/safety
- Resiliency
- Sensing/capture
- Interaction/expression
- Computing
- Glue (comms)



Architecture for hypermediated apps: composable functions

- Local computing and interaction (cellphones, laptops, other)
- Wireless glue, positioning, sensing
- Databases, filters, searching, recording
- Social glue and tracking
- Resilient resources configured on demand
- Authentication, security
- Economic elements (billing, payments)

3 Distinct “Clouds” of resources

- Peer-to-peer cloud (edge)
 - Skype and Croquet
 - End users, personal computing
- Service-on-demand cloud (center)
 - Web 2.0, Second Life and Worlds of Warcraft
 - Amazon, HP, IBM, ... - “Cloud computing”
- Pervasive-context cloud (neighborhood, social context)
 - Social networking, augmented reality, nav systems
 - Google (search, OpenSocial, Android), Facebook

Amazon Web Services

- Key idea: dynamically scalable resources
- EC2 – servers configured on demand for pennies
- S3 – reliable storage on demand
- SimpleDB – databases on demand
- FPS – payments on demand

Resources can be cheap and incremental

Simple Storage Services: \$0.15/GB-Month

Electric Computing Cloud: \$0.10/VM-hour

Flexible Payments Service: 2.9%+\$0.30/payment

Small costs easily bundled into value-added product or advertising-supported services.

Google

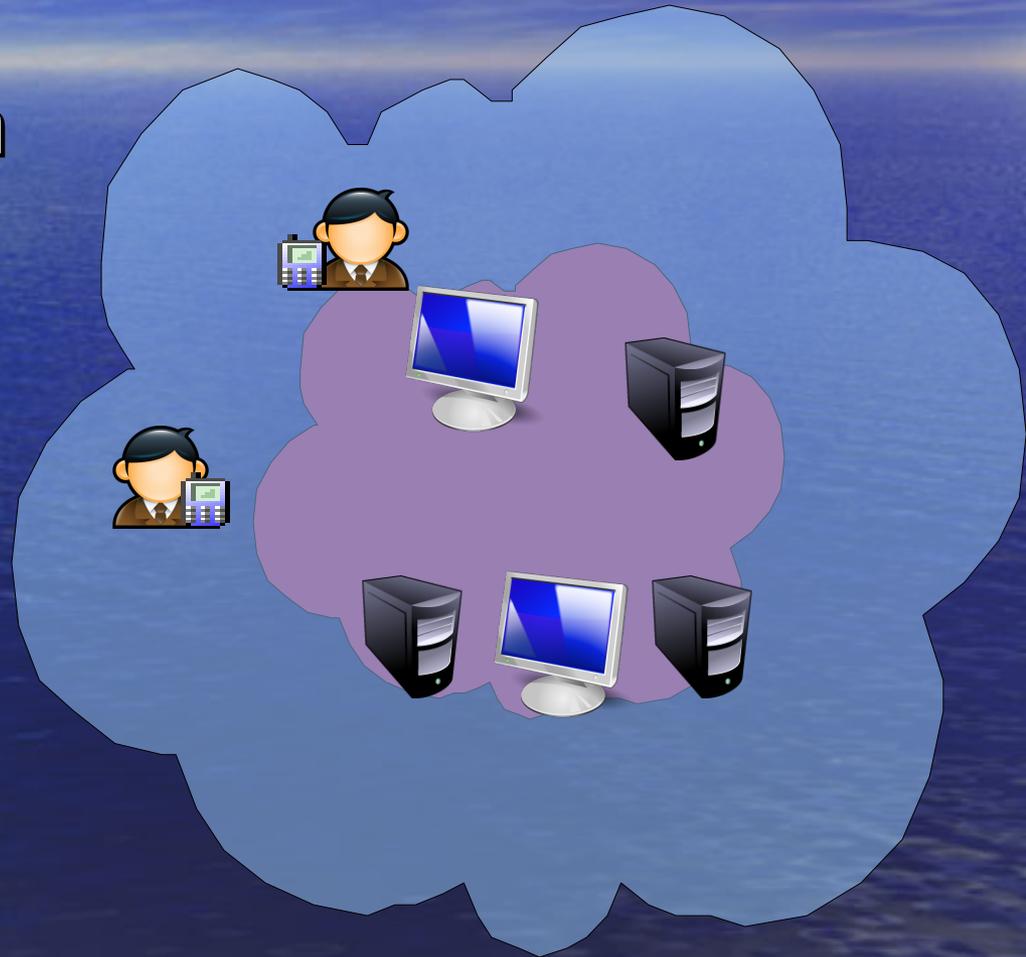
- Geospatial resources (maps, streets, ...)
- OpenSocial – a platform framework for maintaining human-human relationships and identity
- Android – a personal platform that incorporates contextual framework

PlanetLab prototype

- Slices and slice management exemplify planet-scale coordination function
- “Contribute to participate” business model
 - P2P for suppliers
 - Internet suggests peering might work here
- Avoids pricing by arbitrary cost accounting

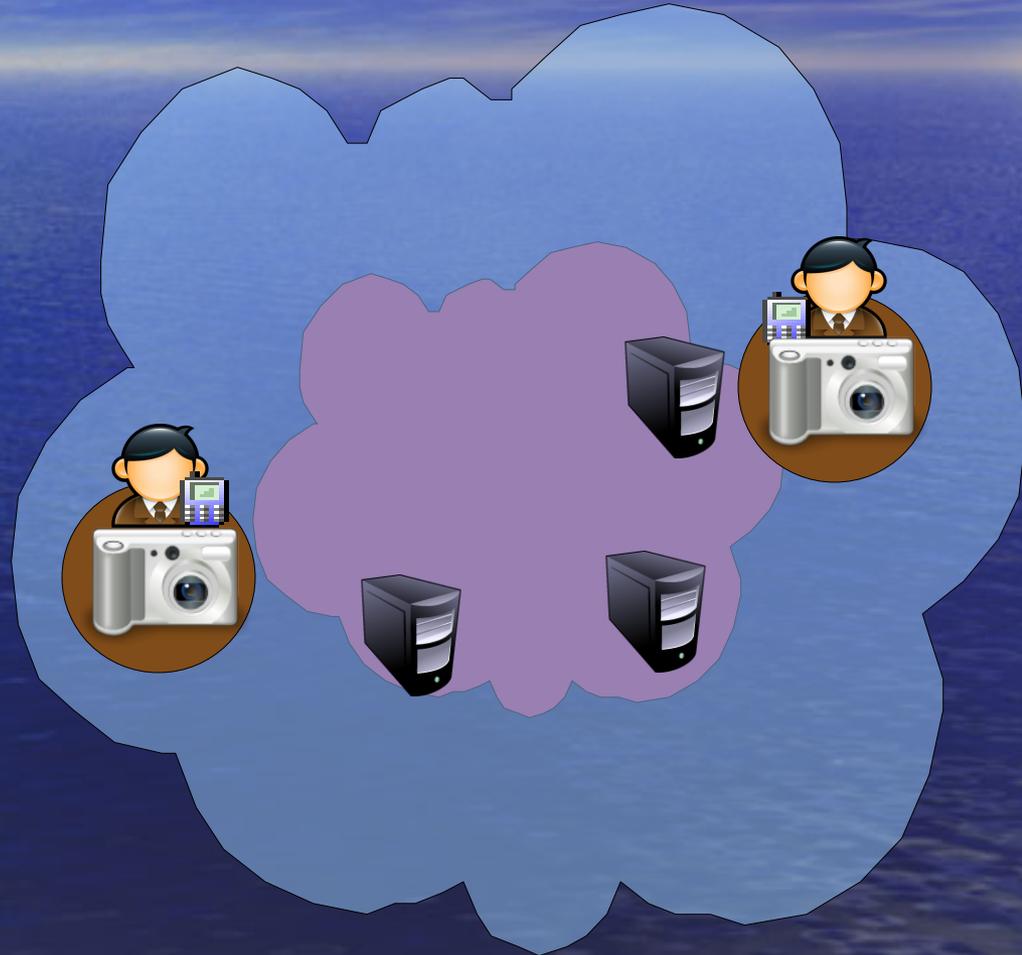
Mobility and Clouds

- A supercomputer in your hand
- A data warehouse on your belt
- Exchanging 1 Terabyte in business cards



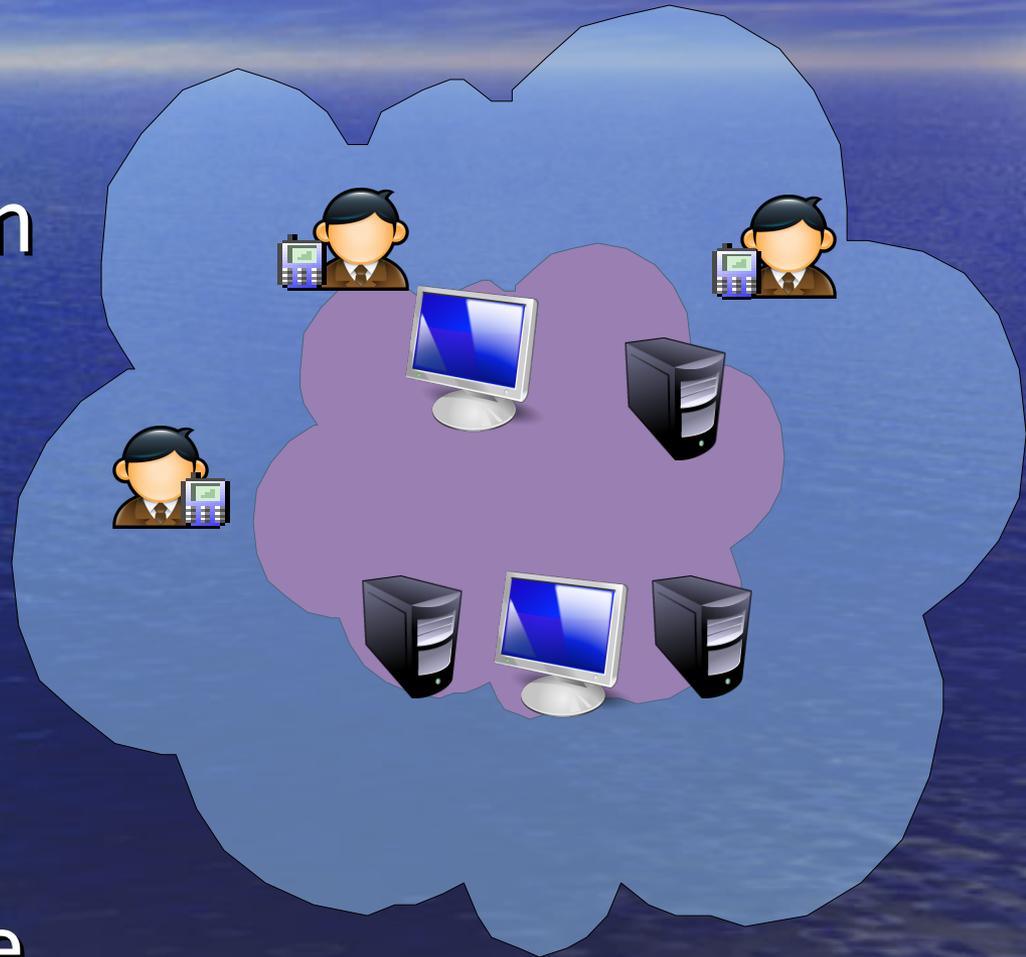
People and Clouds

- “Your life bits” are stored throughout the cloud
- Your social relationships are mediated through the cloud



Business and Clouds

- Enterprise provides additional context in each cloud
 - Roles/relationships
 - Data stores
 - Payment systems
- Inter-enterprise clouds instantiate resources and value



Communications value chain redefined by hypermediation

- Communications platforms provide context
- Transactions, Awareness, Search, Persistence, Resilience become essential platform elements
- Value chain embodied in the cloud via mediated business arrangements
- Resources become liquid

Action items?

- *Computing Distribution Network* in mobile space up for grabs... (Akamai for mobile)
- Interoperability for mediated services across providers - path to growth? W3C or Internet project?
- Peering requires economic exchange framework