“The Future of the Web – The Death of the Browser?”

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Hong Kong

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Caveats

- Don’t claim to be a futurist or a visionary
- Try to be an observer of technology
- Have a “spotty” record recognizing trends

Why Are We Interested in the Future of the Web?

- As users
- As Web professionals
- As educators

“the separate browser will disappear. Instead, there will be just the Web page that you are viewing and you'll have the ability to edit also. Browser and operating system interface will become interlinked.”

--Tim Berners-Lee (1996)

“the most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are distinguishable from it.”

-- Mark Weiser, “The Computer for the 21st Century,” (1991)

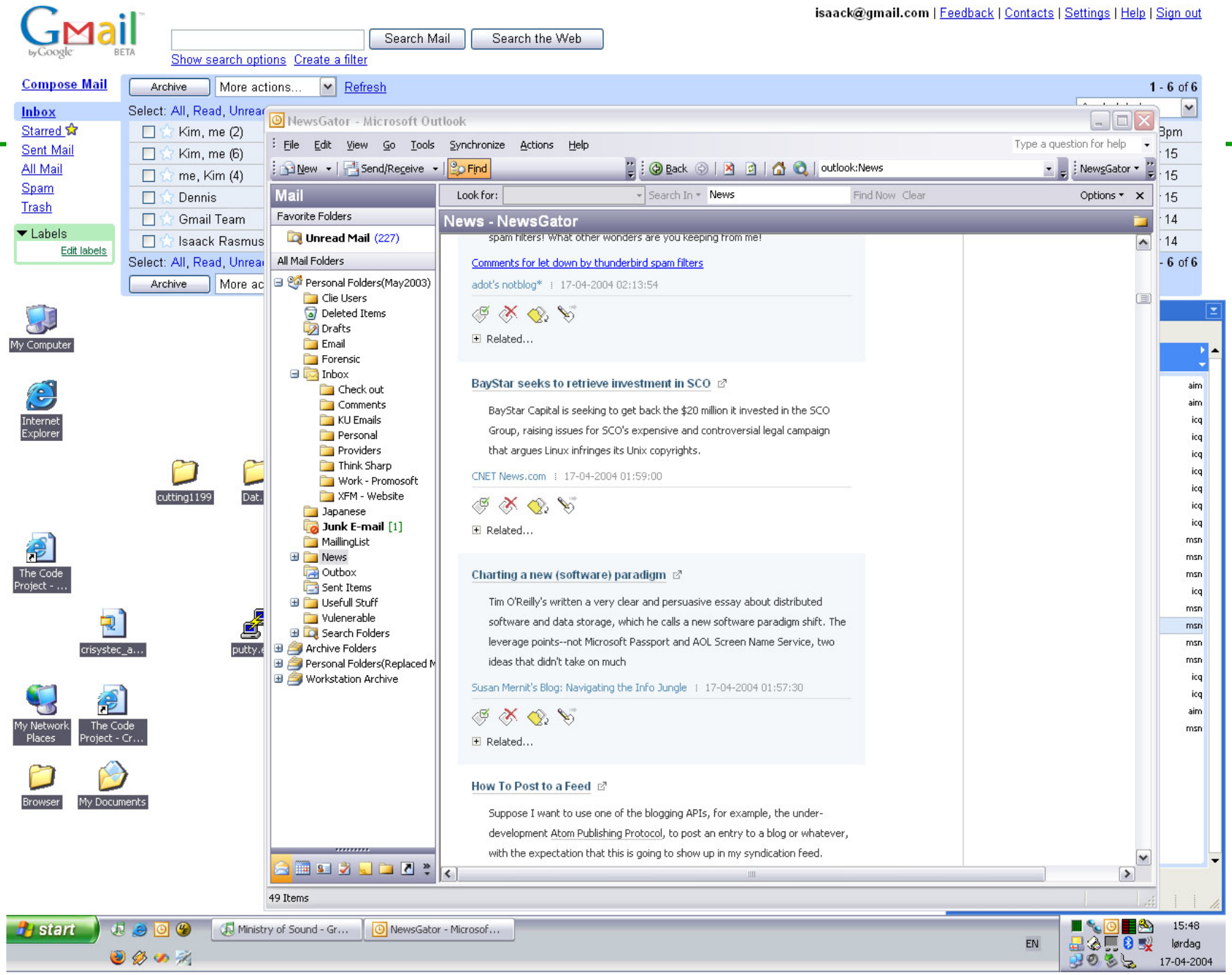
Again-

“The Active Desktop blurs the distinction between working on a local hard drive and a remote URL. True Web integration is a software layer that brings the browser metaphor to the desktop”

-- Microsoft

“It is a ‘virtual browser’ (metaphor), just like the ‘virtual trash’”

-- Bebo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I Think

- Tim and Microsoft both had it half right…
- The future of the Web is the client (or user agent)
- The browser will disappear
- All the signs are right in front of us

The Browser (1/4)

- Has historically been our access mechanism to information (or data)
- Has provided a “window” on the information on the Web
- Primary functionality has been
  - Open location
  - Back
  - Forward
  - Home
  - History/bookmarks
- Lack of functionality has been provided (burdened?) by plug-ins and helper applications

The Browser (2/4)

- Future of the browser was doomed by
  - Search
  - Ubiquitous computing
  - The need for knowledge, not just data/information

Client and Server Technology Drivers

- Computing power
  - Still doubling every 18 months
  - PC-based data centers
- Connectivity
  - Low cost, broad reach Internet
  - Wireless, broadband access
- Device proliferation
  - PDAs, cell phones, gas pumps
  - Towards a digital devices decade
- Internet standards
  - XML-based integration
- User Interface
  - Many (!) possibilities

The Browser (3/4)

- Has not been our access mechanism to knowledge (how we use that information)
- Has been replaced by clients/user agents that are ubiquitous in their presence and are able to serve the purpose of both providing access to information (display), and the context in which to use it
- Machine <-> user applications need browsers
- Machine <-> machine applications do not

The Browser (4/4)

- Internet Explorer 7.0 (rumors)
  - International domain name (IDN) support
  - PNG support
  - New printing functionality
  - RSS aggregator (maybe)
  - Security enhancements
- Firefox 2.0-3.0 (announced)
  - Improvements to Bookmarks/History
  - Per-Site Options
  - Enhancements to the Extensions system, Find Toolbar, Software Update, Search and other areas.
  - Accessibility compliance

What Happened?

- We had the browser wars epitomized by Netscape vs. Microsoft
- MS won, but so what?
- IE vs. Firefox – is this a repeat of the browser wars? Features vs. features?
- It is a battle over the use of a corporate tool vs. an open-source, open-standards tool to access information on the Web

Microsoft vs. Google

- The next great battle on the Web…but
- Google has no plans to build a browser
- It's not just about search
- Google wants to control the desktop (and network?) and allow us to obtain information (from them?) to create applications to obtain information and build knowledge
- Mission statement(s):
  - 'Organizing the world's information and making it universally accessible and useful"
  - "Don't do evil"

This Was Demonstrated When Google..

- Bought companies like Keyhole that allowed non-browser access to geographical information (Google Earth)
- Other purchases (e.g., Picasa et.al.) reflect the same philosophy
- Released their APIs (“Google Hacks”) allowing programmers access to their immense data store IF they wrote applications to use it


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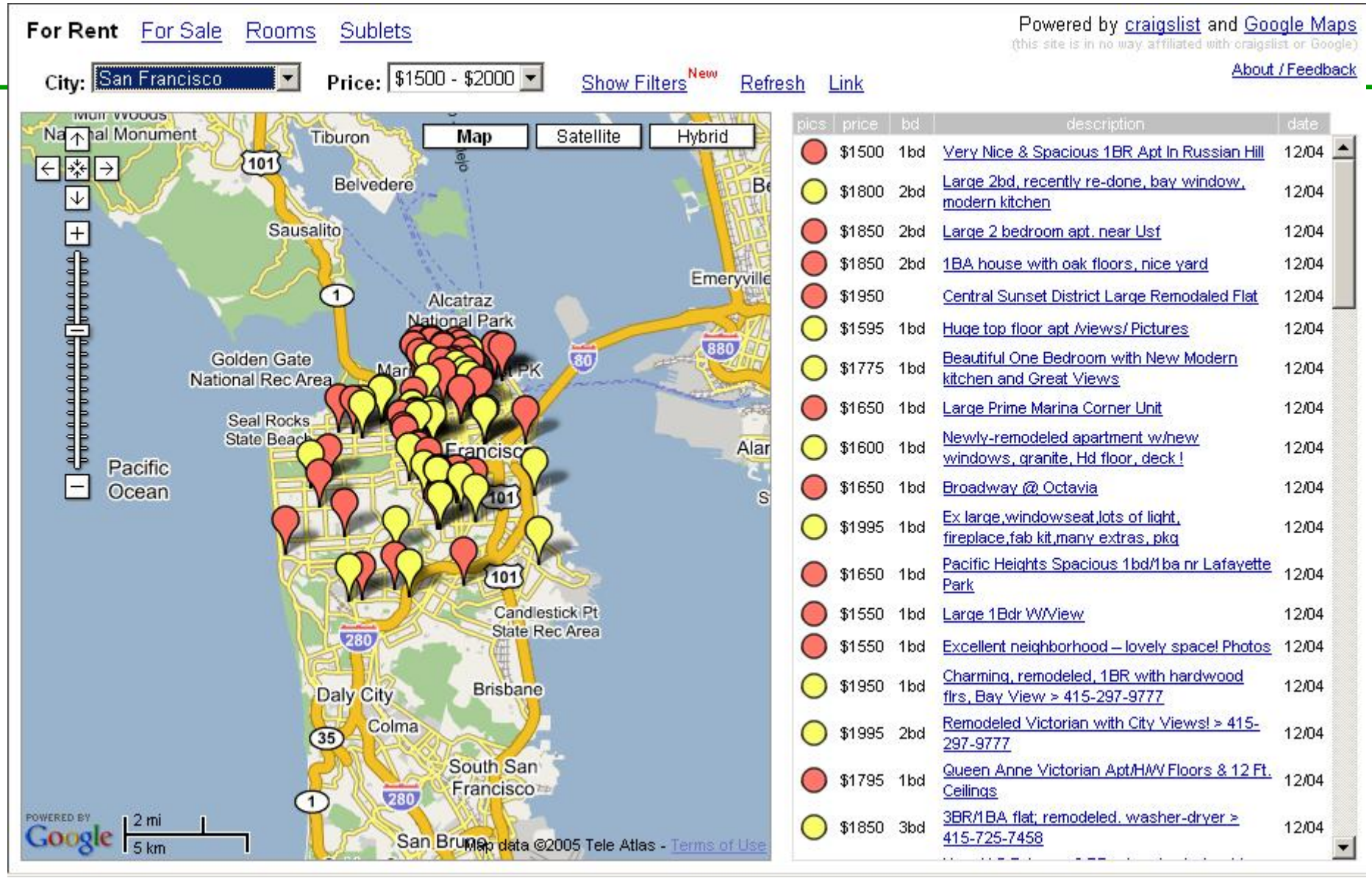
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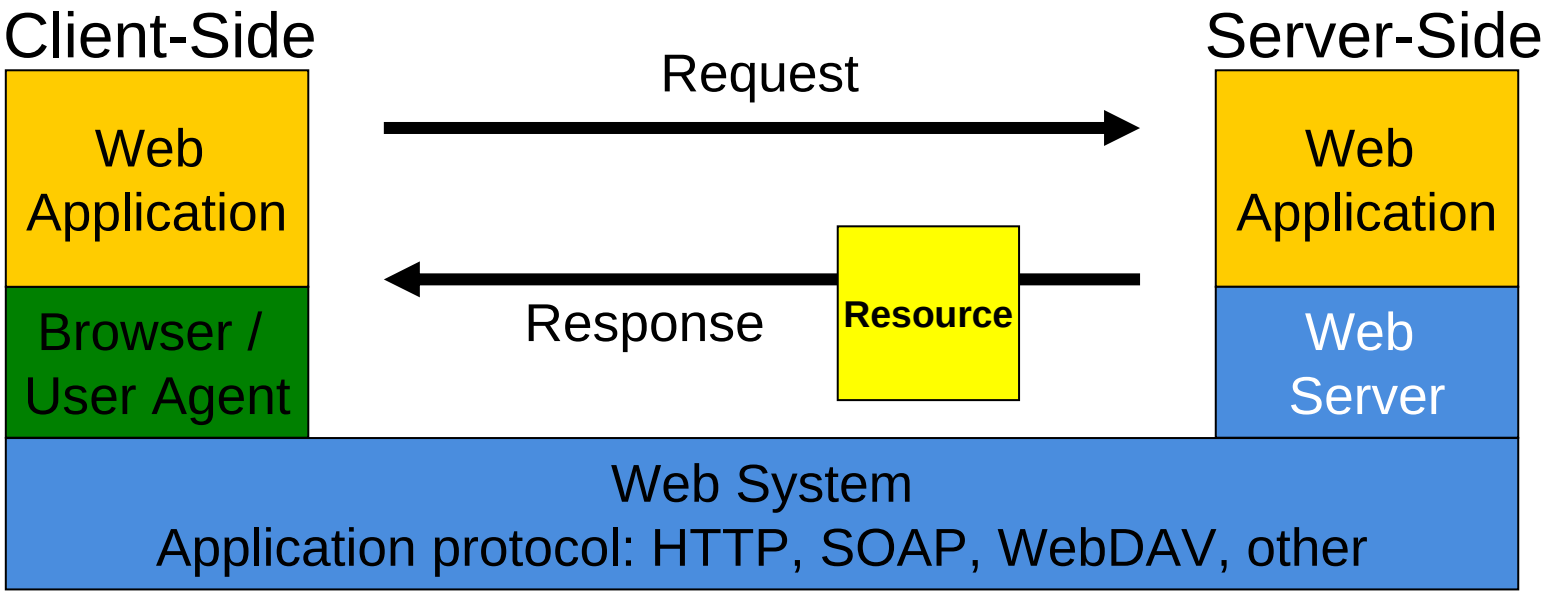
But It’s Not Just About Google…

The Decline of the Browser

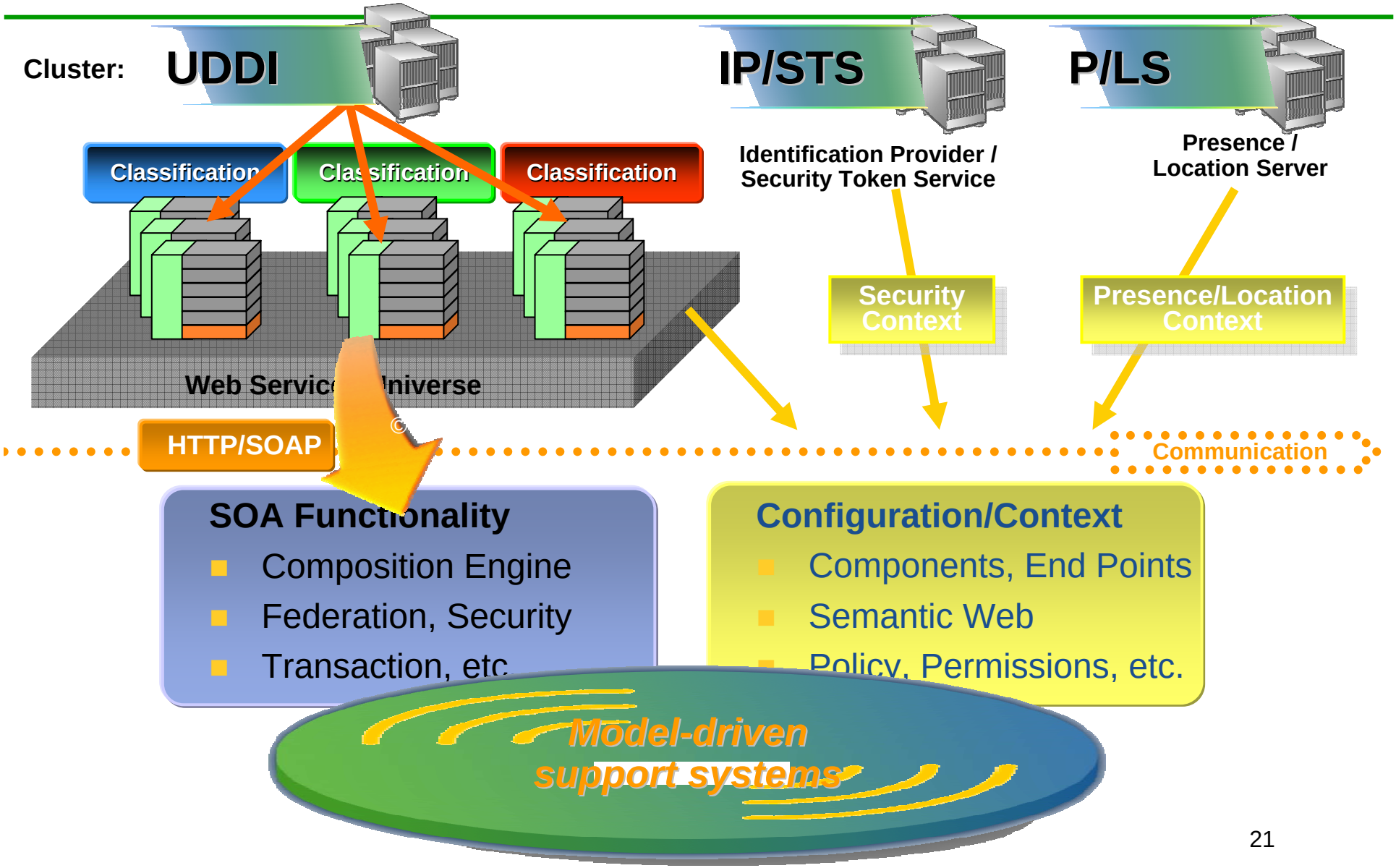
- Partial visions of the future can be seen in three major initiatives in Web technology
  - Web Services
  - Semantic Web
  - Web 2.0

3rd Generation Web



- User Agent
  - Mozilla, IE, and PDA-Browser etc.
  - Other Types of User Agent
  - Plug-Ins, Applets, ActiveX
  - Script-Code
  - DHTML, More...
- Web System
  - HTTP, WebDAV, SOAP, other
  - Cookies
  - UDDI
  - Other relevant protocols FTP, SMTP
  - More...
- Web Server
  - HTTP, more
  - Server-API & CGI
  - XML-Support
  - Component-Support
    - Servlets
    - Web-Services

4th Generation Web



Web Services

- Uses Web-based protocols (such as SOAP) to accomplish required tasks
- Web Services Definition Language (WSDL) defines the interfaces for these tasks
- Browsers (or even clients) may have no logical role in the use of Web Services to accomplish such operations as B2B transaction processing

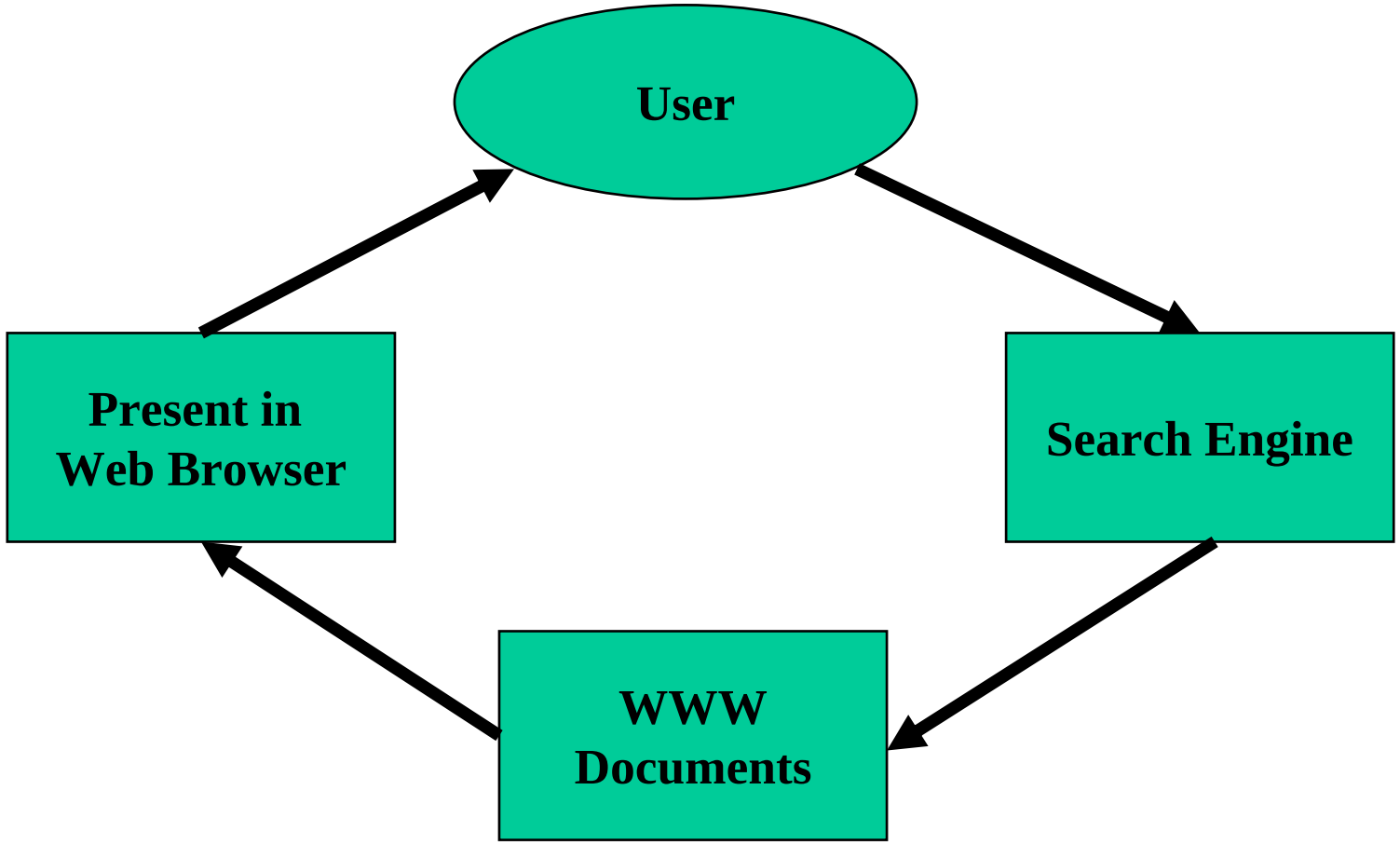
The Semantic Web

- The Semantic Web is the Web for machines and applications…not people
  - Information needs to be structured
  - Technologies include RDF, RDFS, OWL (in addition to those for the Web)
- The Semantic Web introduces “programming on the Web”

Machine Readable Versus Machine Understandable

- In the World Wide Web, information needs humans to give it interpretation
  - Information is predominantly natural language
  - Difficult to mediate by software agents
- In the Semantic Web, information is structured so that it can be interpreted by machines/programs
  - Humans need not interact directly with Semantic Web information – mediation through agents
- Formal meaning is critical to understanding

Today's Web



The Future Web

“The traditional Web browser is like the television set in the 1980’s. The future Web is like TiVo – giving users control over the content, delivery, and use.”

RSS is a Current Implementation of this Model

- RSS – Really Simple Syndication
- An RSS *aggregator* is a software agent that collects RSS feeds (XML) from various sources
- The aggregator provides a consolidated view of the content in a single browser display or software application on any networked device

“Portal Applications” Rather Than Browsers

- Portal: “*a Web site, often incorporating a search engine, that provides access to a wide range of other sites”* (Chambers Dictionary)
- An application provides structured access to data, applies the appropriate access and security policies, and guarantees the provenance of the data
- Should the limitations of a Web browser compromise the availability/usage of data?
- Examples:
  - Web services interface for GRID computing
  - CS Aktive Space

CS Aktive Space

topic/institution institution/topic
institution/person topic/person

Radial: 200 miles **Map:** uk-political

Institution

- Human Computer Interaction and Multimedia
- Computational Algebra and Geometry
- Systems Software Engineering

Birkbeck College

- Computational Intelligence
- Database Technology

Bournemouth University

- Empirical Software Engineering Research Gro
- Systems Engineering University Research Ce

University of Bradford

- Intelligent Information Systems
- Distributed Virtual Environments
- Performance Modelling and Engineering
- Telecommunications Systems

The University of Bristol

- Machine Learning and Data Mining
- Digital Media
- System Design and Verification
- Cryptography and Information Security

Topic

Information Systems

- information interfaces and presentation
- database management
- information systems applications
- information storage and retrieval
- general

Mathematics of Computing

- general
- numerical analysis
- probability and statistics

Software

- software engineering
- general
- programming techniques
- programming languages
- operating systems

Computing Methodologies

- artificial intelligence
- pattern recognition

People

Top 5 10 20

- NR Shadbolt
- SJ Cox
- P Johnson
- WA Gray
- JF Baldwin

CoP

Detail

Web 2.0 (1/2)

- Definition is still evolving
- Many features of the Semantic Web – a “Web of data”
- Shifts the focus to the user of the information, not the creator of the information
- Information has properties and these properties follow each other and find relationships
- Information comes to users as they move around
- Information is broken up into “microcontent” units that can be distributed over dozens of domains

Web 2.0 (2/2)

- Content moves beyond Web sites
- Interaction is no longer limited to HTML
- Users start to control how data is categorized and manipulated
- User agent becomes a “fat” rather than “thin” client
- Requires a new set of tools to aggregate and remix microcontent in new and useful ways
- These tools build the interfaces for Web 2.0
- Examples – RSS, AJAX

Social Networks/Bookmarking/Folksonomies

- Social bookmarking systems
  - Del.icio.us
- Flickr

There Are Still Problems

- Addressing user dependence (“networkless use”)
- Security, privacy, trust
- Etc.

What's Next?

- The browser was the "killer app" for the original Web
- If the browser disappears, what will be the "killer app" for the future one?
- Either there won't be one or maybe this question makes no sense
- Domain-specific applications/portals will be the "killer apps"
- Firefox has shown us that motivated people can write open source, open standards applications for their domains without involving the major players
- Web Services, Semantic Web, and Web 2.0 have shown us how to define, deliver, and integrate content that can be used by these applications
- The next generation of user agents have the capacity to run these applications in the context in which the information they provide can be the most useful

Thanks for your patience!

Questions? Comments?

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