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# Internet Technology Primer

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Allan Project Management Services

- <http://www.apms.com.au/>

Fulcrum Consulting Group

- <http://www.fulcrum.com.au/>

CMGA'99

- <http://www.cmga.org.au/cmga99/>

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# Topics

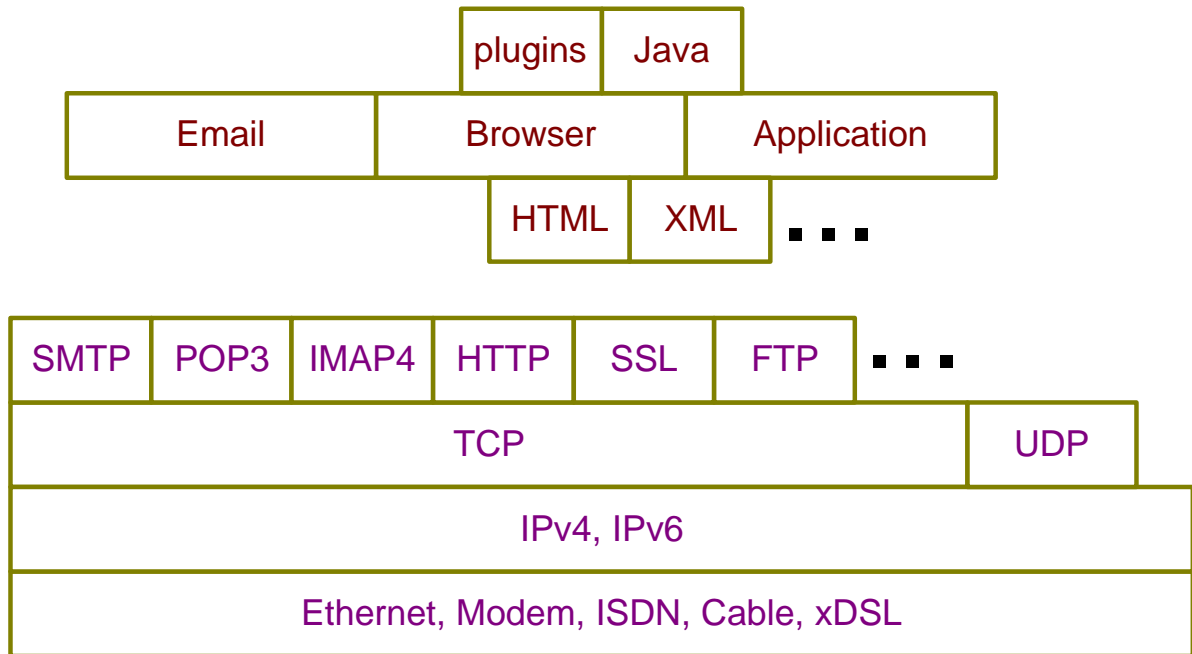
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- TCP/IP
  - Security
  - E-mail
  - HTML
  - XML
  - E-commerce
  - New Technologies
  - The Future
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# TCP/IP

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RFC Index

- <ftp://ftp.isi.edu/in-notes/rfc-index.txt>

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# IPv6

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- A.k.a. IPng
- 128 bit vs 32 bit addressing (340,282,366,920,938,463,463,374,607,431,768,211,456)
- Flexible and expandable global routing hierarchy
- Security (MD5 for authentication and integrity checking / Encryption headers)
- Mobile computing
- Autoconfiguration (combine 48 or 64 bit MAC address with a network prefix)
- Streamlines the forwarding process
- Anycast address is delivered to only one of the nodes in the group, typically the "nearest" node
- quality-of-service (QoS)
- Application Modification
- IPv6 over IPv4 Tunneling
- Extensions to IPv4 do not replicate IPv6 functionality

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IPv6 is short for "Internet Protocol Version 6". IPv6 is the "next generation" protocol designed by the IETF to replace the current version Internet Protocol, IP Version 4 ("IPv4").

Most of today's internet uses IPv4, which is now nearly twenty years old. IPv4 has been remarkably resilient in spite of its age, but it is beginning to have problems.

IPv6 fixes a number of problems in IPv4, such as the limited number of available IPv4 addresses. It also adds many improvements to IPv4 in areas such as routing and network autoconfiguration. IPv6 is expected to gradually replace IPv4, with the two coexisting for a number of years during a transition period.

- <http://www.ipv6.org/>

## The Case for IPv6

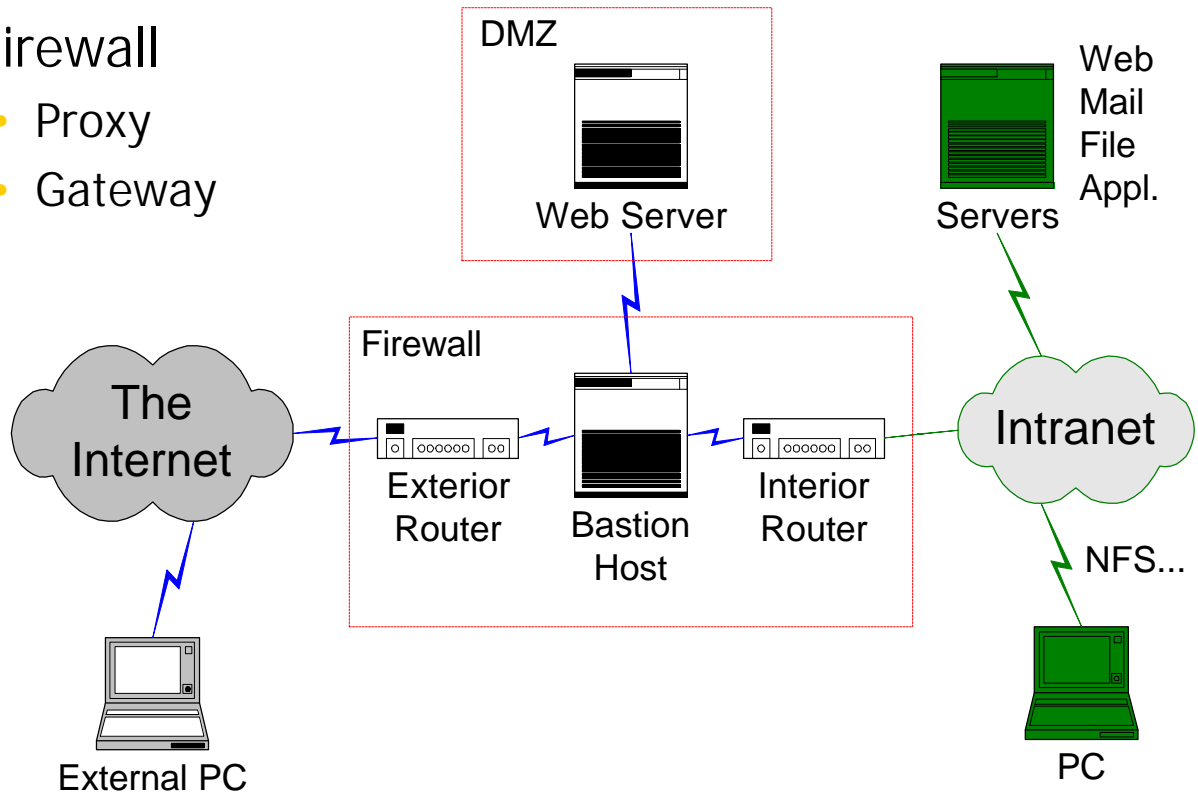
- <http://www.ietf.org/internet-drafts/draft-ietf-iab-case-for-ipv6-04.txt>

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# Security

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- Firewall
  - Proxy
  - Gateway



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Linux Security HOWTO (Also some general security issues)

- <http://www.redhat.com/mirrors/LDP/HOWTO/Security-HOWTO.html>

Firewall (a bit marketing oriented but gives an overview of the issues)

- <http://www.fulcrum.com.au/serv/firewall.html>

FireWall-1

- <http://www.checkpoint.com/products/firewall-1/>

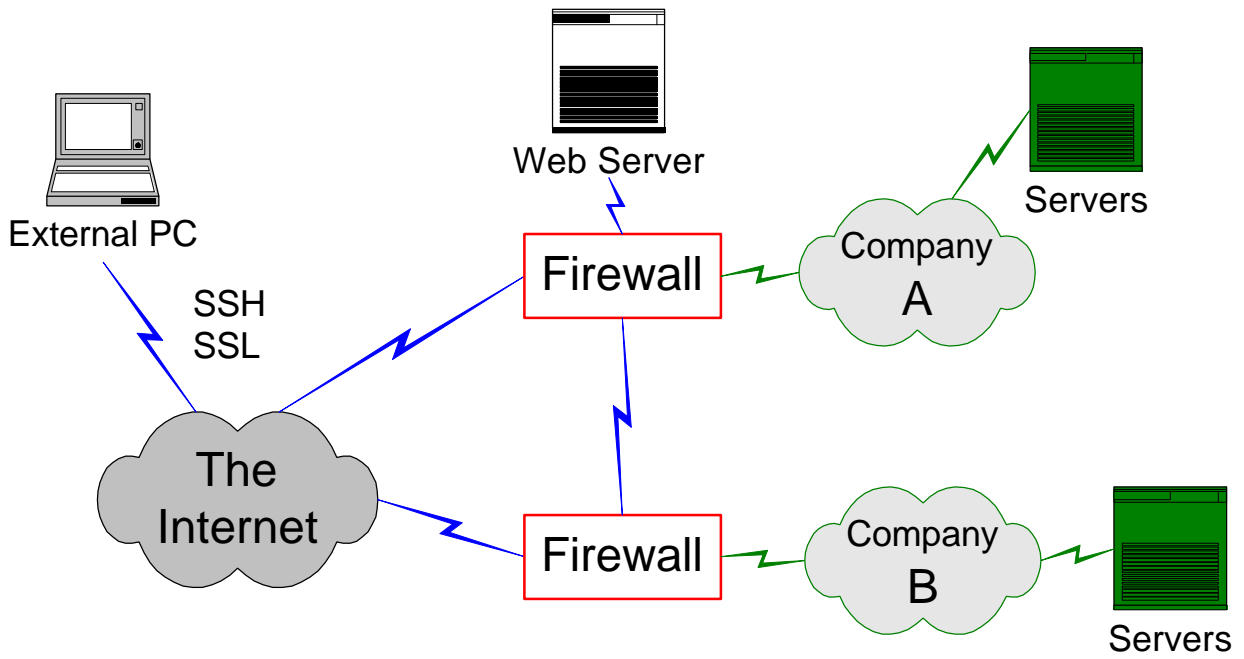
Gauntlet Firewalls

- [http://www.nai.com/asp\\_set/products/tns/gauntlet.asp](http://www.nai.com/asp_set/products/tns/gauntlet.asp)

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# Security

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## Cryptographic Protocols and Standards

- <http://www.ssh.fi/tech/crypto/protocols.html>

## Secure Socket Layer (SSL)

- <http://home.netscape.com/security/techbriefs/ssl.html>

## SSH2 Protocol

- <http://www.ietf.org/html.charters/secsh-charter.html>

## SSH Users Group

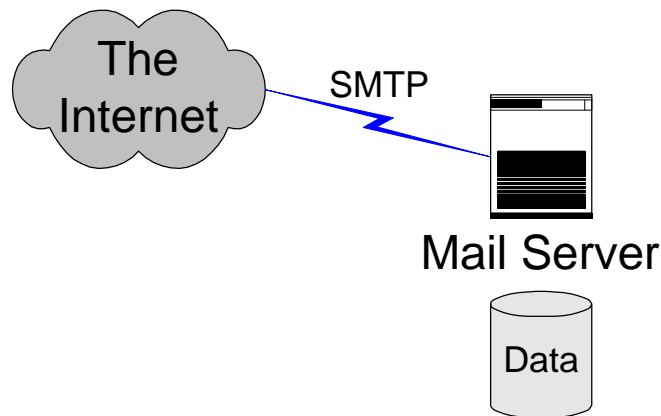
- <http://www.ssh.org/>

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# E-mail

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- SMTP - Simple Mail Transfer Protocol
- POP3 - Post Office Protocol
- IMAP4 - Internet Mail Access Protocol
- Web based email
- LDAP - Lightweight Directory Access Protocol



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## E-Mail Related Links

- <http://www.sendmail.org/other-non-sendmail-links.html>

## Internet Mail Consortium

- <http://www.imc.org/>

## Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types

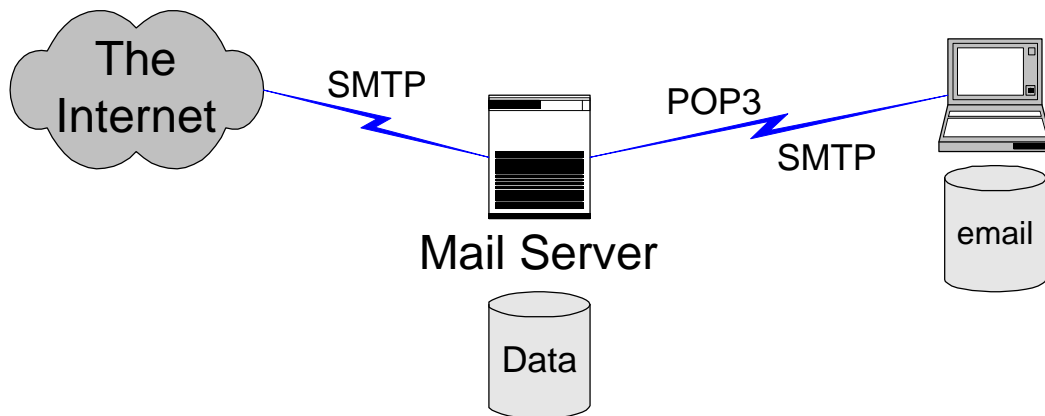
- <http://www.w3.org/TR/REC-DOM-Level-1/>

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# E-mail - POP3

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- Email kept on client

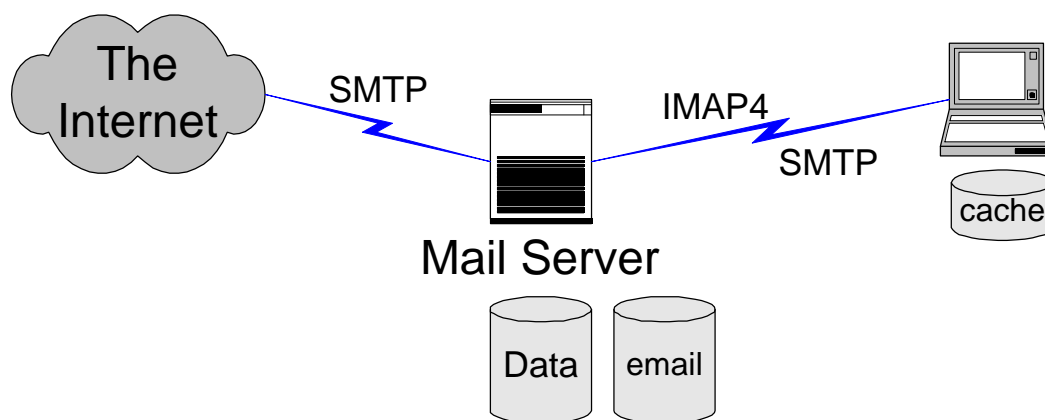


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# E-mail - IMAP4

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- Email kept on server
- Indexes and some data cached on client
- Good multiple client support

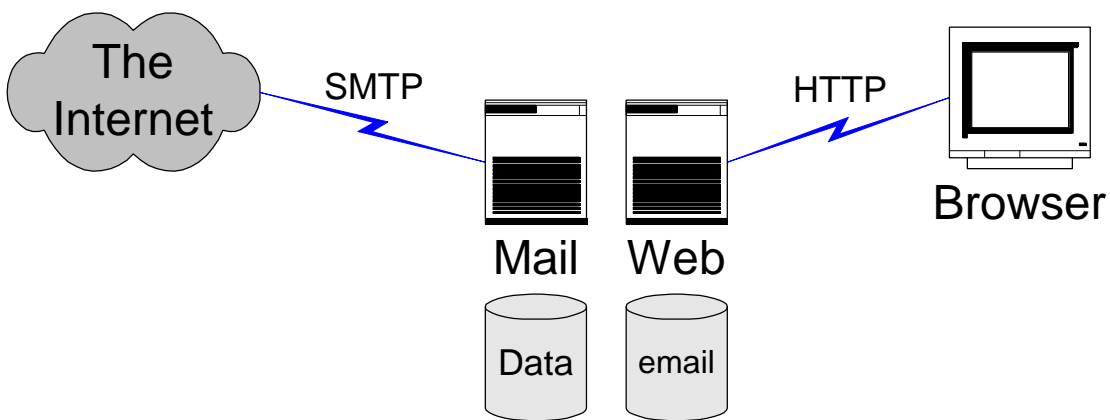


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# E-mail - Web based

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- Email kept on server
- Any browser as client
- Many free services



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Examples of free web based email sites:

- <http://www.hotmail.com>
- <http://www.looksmart.com.au/r?tunnel=email.htm>
- <http://mail.yahoo.com>

WebMail is a www-frontend to Unix system mailboxes. You can compare it to the systems Hotmail, YahooMail etc use.

It allows a user to access his mailbox via the world wide web and do most things other mail programs allow to do, even if he is not sitting on his own personal computer or corporate LAN.

- <http://webmail.woanders.de/>
- <http://webmail.woanders.de/info.html>

iPlanet Portal Services enable an enterprise to transform its intranet or extranet into a personalized portal to reach targeted community groups.

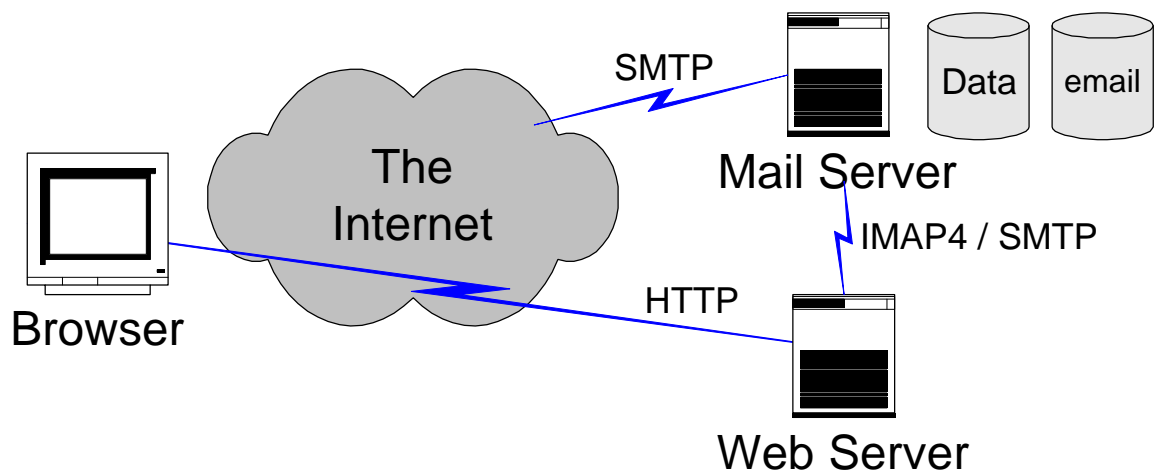
- [http://www.iplanet.com/products/portal\\_svcs/index.html](http://www.iplanet.com/products/portal_svcs/index.html)

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# E-mail - Internet Client

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- Its all TCP/IP... the client can be anywhere on the internet...



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With appropriate use of firewalls...

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# HTML

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- Hypertext Markup Language
  - Presentation and Content
  - Fixed tag set

```
<html>
  <head>
    <title>This documents title</title>
  </head>
  <body>
    <h1>This documents title</h1>
    Some text, some is <b>bold</b>
    <p>
      more text
    </p>
  </body>
</html>
```

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## HTML 4.0 Specification

- <http://www.w3.org/TR/REC-html40/>

## HyperText Markup Language Activity Statement

- <http://www.w3.org/MarkUp/Activity>

## Cascading Style Sheets, level 2 - CSS2 Specification

- <http://www.w3.org/TR/REC-CSS2/>

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# XML

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- XML
  - Well-formed
  - Valid (DTD)

```
<?xml version="1.0"?>
<document>
  <author>
    <given>Tony</given>
    <surname>Allan</surname>
  </author>
  <section>
    <para>Hello, world!</para>
  </section>
</document>
```

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Extensible Markup Language (XML)

- <http://www.w3.org/XML/>

XML

- <http://www.xml.com/>

The SGML/XML Web Page

- <http://www.oasis-open.org/cover/xml.html>

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# XML - DTD

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- Document Type Definitions
  - MathML - Mathematical Markup Language
  - SMIL - Synchronized Multimedia Integration Language
  - CML - Chemical Markup Language
  - FinXML - Financial Markup Language
  - RDF - Resource Definition Framework
  - SVG - Scalable Vector Graphics
  - XHTML
- Applications using XML file formats:
  - AbiWord - Wordprocessor
  - Dia - Drawing package
  - gNumeric - spreadsheet

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Chemical Markup language

- <http://www.xml-cml.org/>

FinXML - The Digital Language for Capital Markets

- <http://www.finxml.org/>

Resource Description Framework (RDF)

- <http://www.w3.org/RDF/>

Graphics Activity Statement

- <http://www.w3.org/Graphics/Activity>

Scalable Vector Graphics (SVG) 1.0 Specification (Working Draft)

- <http://www.w3.org/TR/WD-SVG/>

AbiWord - The Open Source, Cross-Platform Word Processor

- <http://www.abiword.org/>

Dia - a Visio like drawing package

- <http://www.lysator.liu.se/~alla/dia/dia.html>

gNumeric - The GNOME Spreadsheet

- <http://www.gnome.org/gnumeric/>

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# MathML

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- MathML is a low-level format for describing mathematics

- $x^2 + 4x + 4 = 0$

```
<mrow>
  <mrow>
    <msup> <mi>x</mi> <mn>2</mn> </msup> <mo>+</mo>
      <mrow>
        <mn>4</mn>
        <mo>&invisibletimes;</mo>
        <mi>x</mi>
      </mrow>
    <mo>+</mo>
    <mn>4</mn>
  </mrow> <mo>=</mo> <mn>0</mn>
</mrow>
```

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W3C's Math Home Page

- <http://www.w3.org/Math/>

W3C Math Activity Statement

- <http://www.w3.org/Math/Activity>

Mathematical Markup Language (MathML) 1.01 Specification

- <http://www.w3.org/TR/REC-MathML/>

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# SMIL

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- Using SMIL, an author can:
  - describe the temporal behaviour of the presentation
  - describe the layout of the presentation on a screen
  - associate hyperlinks with media objects
- In the following example fragment, the position of a text element is set to a 5 pixel distance from the top border of the rendering window:

```
<smil>
  <head>
    <layout> <region id="a" top="5" /> </layout>
  </head>
  <body> <text region="a" src="text.html" dur="10s" /> </body>
</smil>
```

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## Synchronized Multimedia Integration Language (SMIL)

- <http://www.w3.org/AudioVideo/>

## Learn SMIL

- <http://www.empirenet.com/~joseram/index.html>

## SMIL Output in Java Applets

- <http://www.empirenet.com/~joseram/index.html>

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# XHTML

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- XHTML - Recasting HTML in XML
  - make a fresh start with a new generation of HTML, which would be re-cast as a suite of XML tag-sets
  - based on HTML 4.0
  - An improved match to database and workflow applications
  - Tables emphasize the data model
  - Style sheets become more important
  - Mark-up to meet the different needs of a variety of devices
  - Transforming mark-up to make it suitable for different devices

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XHTML 1.0: The Extensible HyperText Markup Language

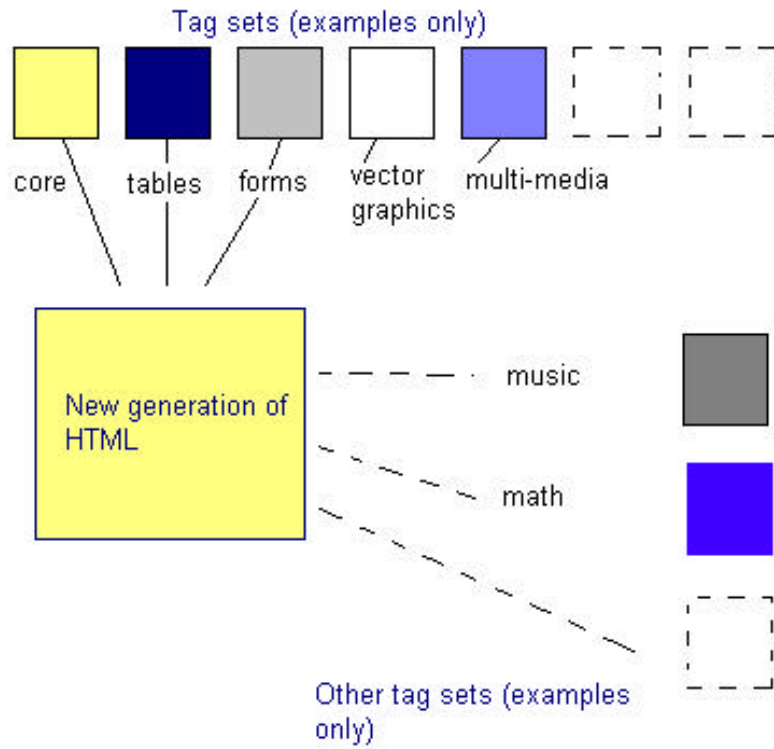
A Reformulation of HTML 4.0 in XML 1.0

- <http://www.w3.org/TR/xhtml1/>

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# XHTML

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# XML

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- Content is king
- Presentation as needed - dynamic
- Stored as XML or in databases
- Technology Neutral Message encoding
- Signed XML for purchases - difficult
- XML to XML translators
- Many of the parsers written in Java
- DOM - Document Object Model

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XFDL: Creating Electronic Commerce Transaction Records Using XML

- <http://www8.org/w8-papers/4d-electronic/xfdl/xfdl.html>

Document Object Model (DOM) Level 1 Specification

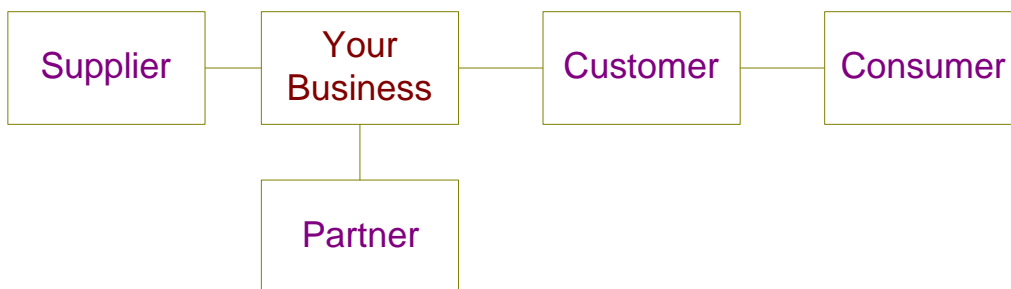
- <http://www.w3.org/TR/REC-DOM-Level-1/>

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# e-commerce

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- Electronic Commerce (a.k.a. e-commerce) is the application of Information Technology to electronically enable you to do business with other businesses (Customers, Suppliers and Partners) and Consumers. Its purpose is to create new or more effective streams of business. The aims of e-commerce are to deliver increased income, lower costs and achieve competitive advantage.



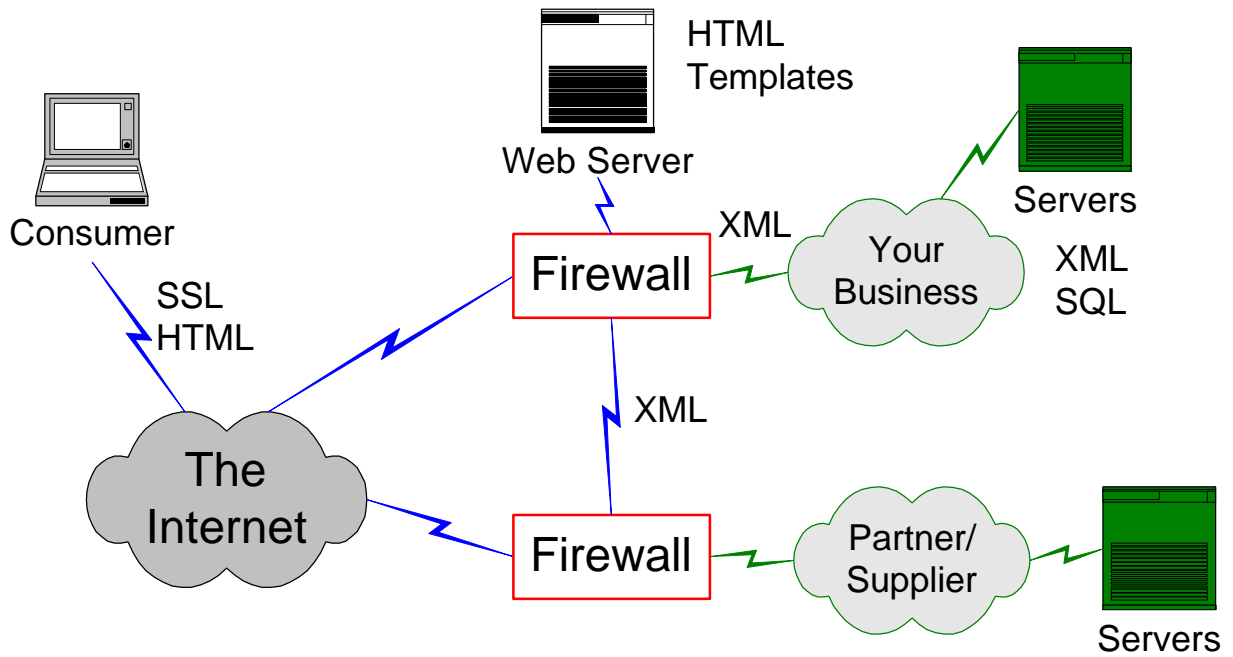
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Fulcrum definition of Electronic Commerce. For more information, email:  
[tony.allan@fulcrum.com.au](mailto:tony.allan@fulcrum.com.au)

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# e-commerce

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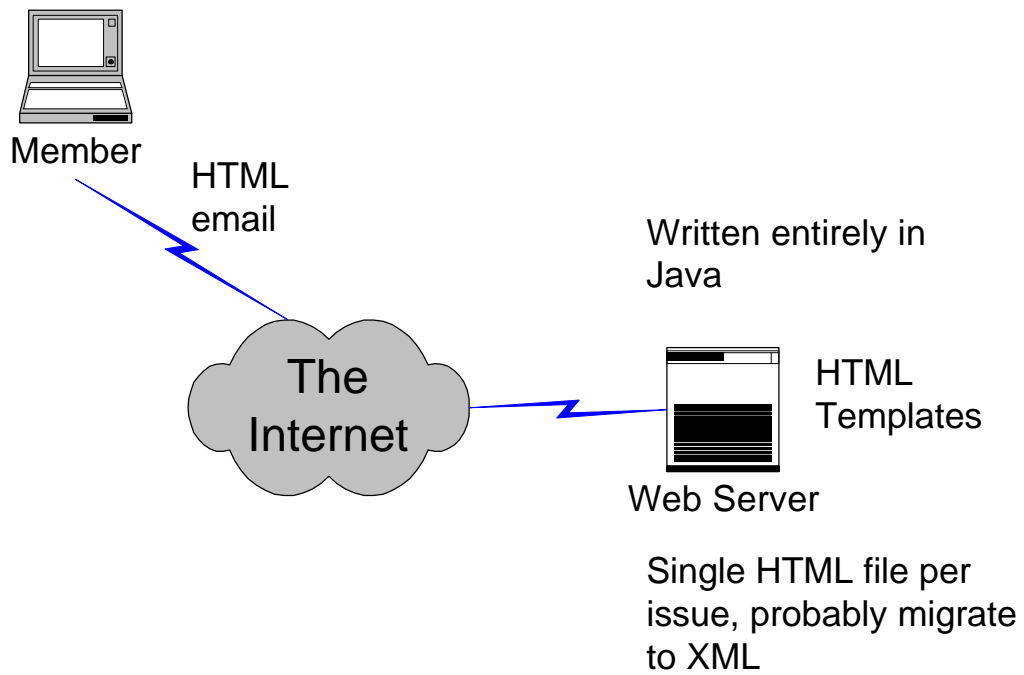
Many of the technologies described earlier in this presentation, are needed to enable reliable, secure e-commerce.

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# CMGA Journal

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- <http://journal.cmga.org.au>



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CMG Australia Journal

- <http://journal.cmga.org.au/>

CMG Australia On-line Journal - A Case Study

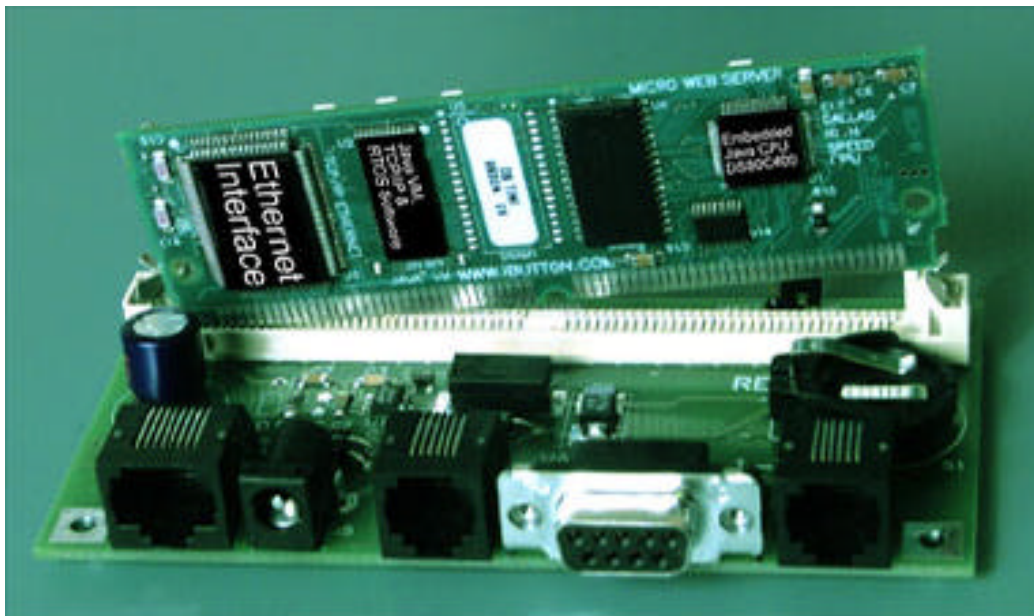
- <http://www.apms.com.au/papers/allan99a/sld001.htm>

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# New Technologies

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- Java... Jini... iButtons...
- 8cm x 3cm



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With a simple Web server application, TINI can act as the world's smallest Java Web server. Model 390 TINI chip set, which includes a processor, Ethernet controller, and Flash ROM.

- <http://www.ibutton.com/TINI/index.html>

Jini™ connection technology is based on a simple concept. Devices should work together. They should simply connect. No drivers to find, no operating system issues, no weird cables and connectors.

- <http://www.sun.com/jini/>

What is Jini Connection Technology?

- <http://jini.org/whatisjini.html>

iButtons

- <http://www.ibutton.com>



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# New Technologies - PMC

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- Hardware search engine



- PMC - Pattern Matching Chip
- Since the PMC search through data at a fixed speed (100 MB/s), the response time for a query is independent of its complexity
- 128 to 256 PMCs in a server
- aggregated bandwidth (12 GB/s for a 128 PMC system)
- 128 to 256 Mbytes memory per PMC

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FAST PMC - The Pattern Matching Chip is a special purpose VLSI chip built for massively parallel searches in "raw" data.

- <http://www.fast.no/product/fastpmc.html>

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# New Technologies - PMC

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- "all of Internet" search server 
  - 300 million web pages
  - 5 Kbytes text information on each page
  - 1.5 Tbytes of RAM costs \$1.5 million (~ \$1 / Mb)
  - With 128 MB per PMC, 16 PMCs per PCI card and 8 PCI cards per PC, approximately 90 PCs are needed.
  - Equivalent to 15 cabinets.
  - Accumulated bandwidth >1 Tbytes per second.
  - 64 queries simultaneously, with a response time of less than 1.3 seconds. This is equivalent to 50 queries per second, or more than 4 million queries per day.

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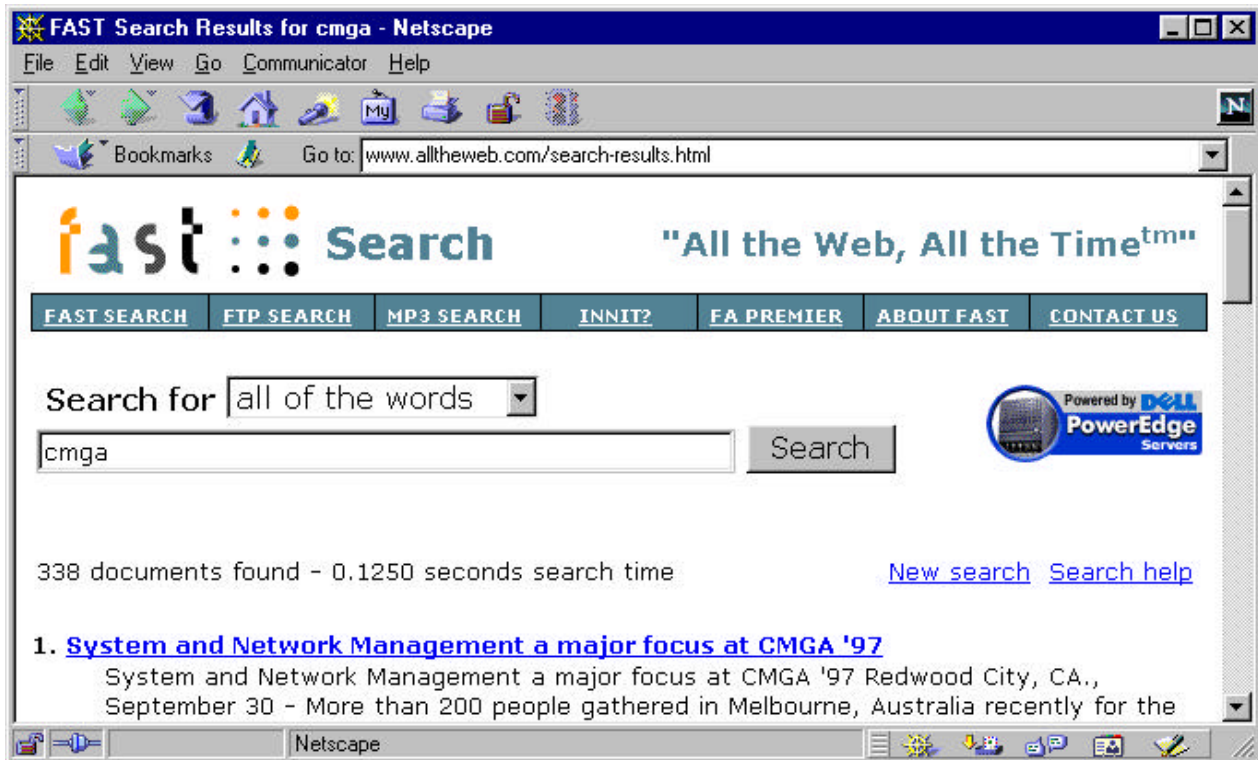
FAST PMC (Pattern Matching Chip) Frequently Asked Questions

- <http://www.fast.no/faq/faqfastpmc.html>

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# New Technologies - PMC

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## Fast Search

- <http://www.alltheweb.com/>

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# The future is now!

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- Instant messaging (ICQ, IRC)
- Streaming media and MP3
- WebTV

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Instant Messaging and Presence Protocol (impp)

- <http://www.ietf.org/html.charters/impp-charter.html>

A Model for Presence and Instant Messaging (DRAFT)

- <http://www.ietf.org/internet-drafts/draft-ietf-impp-model-03.txt>

MP3

- <http://www.mp3.com/help/>

Wired 7.08 - Many MP3 articles

- <http://www.wired.com/wired/archive/7.08/>

WebTV

- <http://www.webtv.com/>

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# The future

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- In the future, disconnecting from the Internet will be as absurd as unplugging your phone after every call...

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## General References

WWW8 Conference Refereed Papers

- <http://www8.org/fullpaper.html>

World Wide Web Consortium

- <http://www.w3.org/>

The Internet Engineering Task Force

- <http://www.ietf.org/>

Citations for all RFCs in numeric order (since Apr-07-1969)

- <ftp://ftp.isi.edu/in-notes/rfc-index.txt>