The Future of WWW

in High Energy Physics

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* Presented at Computing In High Energy Physics, April 1994

The Future of WWW

Topics to be discussed

- The Past and Present of the Web
- A Real-World application -- CommerceNet
- Forthcoming Technical Enhancements
  - > Their impact on HEP use of the web
- Lessons for HEP
  - > from WWW usage outside HEP
  - > from WWW collaboration

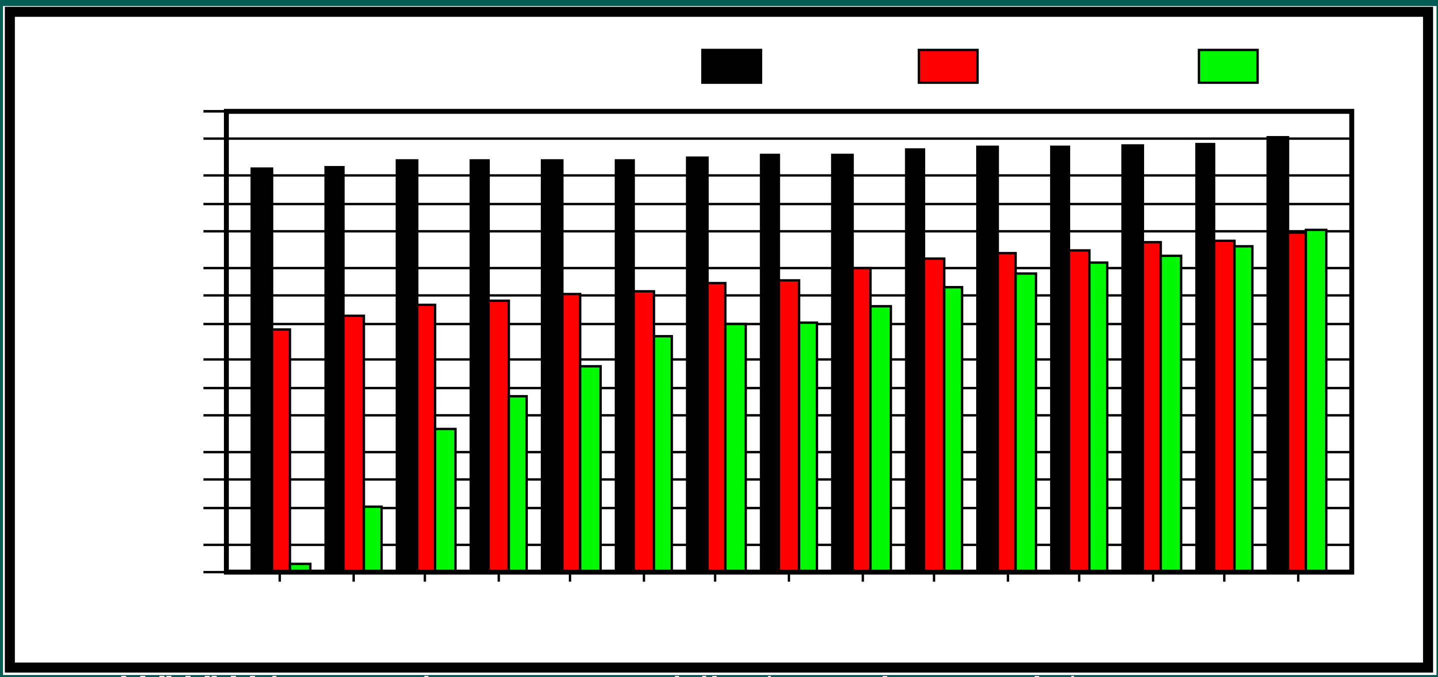
Past and Present of the Web

- 1990 - Project Proposed and Initiated at CERN
  - by Tim Berners-Lee and Robert Cailliau*
    - (Planned to be complete in 6 months)
- 1991 - NeXT and line-mode Browsers implemented at CERN
- 1992 - Viola and Midas browsers released for X
  - Relatively slow growth compared to gopher
- 1993 - NCSA's Mosaic developed and released
- 1994 - Explosive growth
  - many articles in press including N.Y. Times, London Guardian, Economist etc. etc.
  - Many commercial applications of WWW emerging
    - Global Network Navigator
    - CommerceNet

* Much early history of web already lost - need to institute cyperspace historical markers

How big is the Web?

- NSFNet backbone Traffic



WWW is growing very rapidly (note log scale)

  > Does not dominate network (ftp, telnet, mail, news all larger)

- A Typical (??) Server - WWW meets the Olympics
  > Connections after first week of Olympics: 1,320,000
  > Number of distinct hosts: (18,000 + 13,000)
  > Number of distinct countries: 42 (out of 64)
- Tony’s Wild Guesstimates
  > 200 people worldwide working on web related software
  > 2000 HTTP servers
  > 20000 information providers
  > 200,000 - 2,000,000 web users

CommerceNet

Commerce on the Internet

- CommerceNet is managed by EIT in Palo Alto
  - > Initial announcement April 12
  - > $12 million of initial funding
    - > 50% from government
    - > 50% from founding members
- CommerceNet will use WWW to allow its members to
  - > Consult directories and referral services
    - > Open Access to directories for new members
    - > Possibilities for other directory providers
  - > View multimedia catalogs and product demos
  - > Solicit bids, place orders
  - > Collaborate
- CommerceNet has added public-private key encryption to WWW, using technology licensed from RSA
  - > NCSA will distribute *Privacy Enhanced Mosaic*
  - > RSA client side library will be made available for other WWW browsers
  - > EIT will create *Reference Implementation* of server including server side encryption
  - > EIT will sell *supported* server

CommerceNet

- Goals
  - > 1000 members by the end of this year
    - > initially mainly in Silicon Valley
  - > Millions of members worldwide in five years
- Expect to revolutionize way business is performed
  - > Small businesses able to compete on <u>equal-terms</u>
  - > Global competition
  - > Elimination of vertically structured companies?

Technical Innovations

...and their impact on HEP

- HTML+
  - > Will add tables - badly needed for documentation
  - > Also figures with wrap around text, captions
- Beyond HTML+
  - > General SGML acceptance with DTD
  - > Style sheets
  - > Commercially supported layout languages?
    - > Adobe Acrobat - PDF
    - > Object Oriented document formats - OpenDOC
- Security - Encryption and Authentication
  - > Opens WWW to wider use
    - > Publications in preparation
    - > Control applications
- Editors
  - > Currently tkWWW, NeXT browser only editors
  - > Many translators exist
    - > Frame to HTML
    - > Word To HTML
  - > Need High Quality browser-editor

Technical Innovations

continued...

- Forms, Interactive documents
  - HTML+ style forms are already in wide-spread use
  - Likely to become more powerful in future
  - WWW as easy-to-use client-server GUI
    - Could build entire control. monitoring system using WWW
  - Wide range of interactive features not possible with paper documents still to be explored
    - Collapsible lists
    - Interactive documents
- Integration of Collaborative, Multimedia Tools
- Indexing the Web
  - Many indexes already available
    - Virtual libraries - entirely manual
    - Mother-of-all bulletin boards - forms based input
    - w3catalog - my personal favorite
    - Jump Station
    - ALIWEB - Archie Like Indexing of web
  - Better, more complete indexing coming
- Commercialization
  - More, Better tools

Lessons for HEP

from WWW usage

- HEP is missing great opportunity to advertise its goals and achievements to a large audience (including high school students, undergraduates etc.)
  - > Should organize non-technical (semi-technical?) descriptions of
    - > HEP as a whole
    - > Individual experiments, including purpose and summary of results
    - > major facilities, laboratories, plans for future
  - > Although we originated WWW we have been overtaken in this area by many others (c.f. NIST)
- Need some HEP-wide organization of directories covering
    - > Experiments
    - > Publications
    - > Laboratories and Universities
  - > Better to have one to two well done directories than many incomplete directories
  - > Directories no good unless they are correct, maintained, easy to identify those responsible (c.f. NASA)
  - > No shortage of work to be done - need some way to distribute load around labs.

Lessons for HEP

from WWW collaboration

- WWW as a model for HEP computing collaboration?
  - Large spontaneous collaboration of people world-wide have made WWW what it is today
    - Almost no face-to-face meetings
    - real discussion of issues over www-talk mailing list
    - real decisions made as result of discussions*
- What has made this collaboration possible?
  - Open discussion of issues prior to decisions, implementation
  - Modular design with well defined protocols
    - Easy for people to take a small part of the project and work with it
  - Dependence on standards where appropriate
    - SGML, MIME
  - Welcoming to outside involvement
  - always been a list of jobs in progress, to-be-done at CERN

* often frighteningly fast!!!

Conclusions

- Future of Web is in commercial world
- Still plenty of scope for HEP to expand its use of WWW
  - > for collaboration
  - > for reference material, on-line conferences
  - > pre-prints, published papers
  - > as a quick and flexible GUI tool
  - > for informing public about HEP

Final thought...

- Internet culture is full of young, incredibly enthusiastic people, who realize what they are doing is really having an effect
- We need to make HEP computing more open to change...