INTERNET AND WEB DEVELOPMENTS

Aiko Pras

Centre for Telematics and Information Technology (CTIT)
University of Twente (UT)
The Netherlands

http://www.home.ctit.utwente.nl/~pras

PRESENTATION AT CMG
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OVERVIEW

BANDWIDTH DEVELOPMENT
  - WIRED
  - WIRELESS
  - COSTS

PROTOCOLS
  - IP
  - WEB SERVICES
BANDWIDTH - WIRED
BANDWIDTH - WIRED

CAPACITY ACCESS LINE IN THE YEAR 2005:
  • 4 TO 10 DIGITAL TV SIGNALS
  • 100 TO 250 HIFI AUDIO SIGNALS
  • 2000 WEB PAGES PER SECOND

CAPACITY BACK BONE LINE IN THE YEAR 2005:
  • 100,000 DIGITAL TV SIGNALS
  • 2,500,000 HIFI AUDIO SIGNALS
  • 15 MILLION TELEPHONE CALLS
  • 25 MILLION WEB PAGES PER SECOND
DO WE NEED SO MUCH BANDWIDTH?

LETS TAKE A LOOK AT THE CAMPUS-NET OF THE UNIVERSITY OF TWENTE

- 2000 USERS
- 100 Mbps ACCESS
CAMPUS-NET
CAMPUS-NET

Top 8 by volume, IF-MIB vs NeTraMet

- IF-MIB out
- IF-MIB in
- NeTraMet out
- NeTraMet in

Volume (bytes)

10.0.8.107 10.0.1.250 10.0.5.152 10.0.4.87 10.0.8.79 10.0.6.85 10.0.8.152 10.0.7.251
CAMPUS-NET

Graph showing the Volume (Gbytes) of data for the 200 Nth users, comparing IF-MIB and NetraNet.
INTERMEDIATE CONCLUSION

POTENTIAL BANDWIDTH CONSUMPTION HIGHER THAN MANY PEOPLE EXPECT

50 GB / WEEK NOT UNREALISTIC

WHAT WOULD HAPPEN WITHOUT UT POLICY TO LIMIT BANDWIDTH?
BANDWIDTH - WIRELESS

- 802.11
- FIXED ACCESS
- CSD
- BACKBONE

[Graph showing bandwidth growth over time from 1980 to 2005]
WIRELESS - COSTS GPRS

NETHERLANDS:
KPN: 2,25 EURO PER MB
VODAFONE: 1,50 PER MB

GERMANY:
E-PLUS: 25 EURO PER MB
VODAFONE: 1,90 EURO PER MB
WIRELESS - COSTS GPRS

COSTS OF COPYING 1 CD
(600 MB)

900 EURO

DOWNLOAD TIME: 13 HOURS
CAMPUS-NET

Top 8 by volume, IF-MIB vs NeTraMet

Volume (Gigabytes)

10.0.8.107 10.0.1.250 10.0.5.152 10.0.4.87 10.0.8.79 10.0.6.85 10.0.8.152 10.0.7.251

20 40 60 80 100 120 140
CAMPUS-NET

UT:
• 23 MEURO / WEEK
• 1200 MEURO / YEAR
INTERMEDIATE CONCLUSION

• GPRS / UMTS WILL BE EXPENSIVE (UNDER-STATEMENT)

• GPRS / UMTS WILL NOT REPLACE FIXED INFRASTRUCTURE

• FOR WIRELESS WE WILL HAVE IEEE802.11 HOTSPOTS
WHAT ABOUT PROTOCOLS

AT NETWORK LAYER:
  • IP (v4/v6)

ABOVE NETWORK LAYER (MIDDLEWARE):
  • WEB PROTOCOLS
  • STREAMING PROTOCOLS
  • ...
WEB PROTOCOLS - DEVELOPMENTS

PHASE 1: HTTP+HTML
- CLIENT IS HUMAN BEING
- ONE WAY COMMUNICATION (FROM SERVER TO CLIENT)

PHASE 2: HTTP+XML
- CLIENT CAN BE HUMAN BEING OR PIECE OF SOFTWARE
- ONE WAY COMMUNICATION (FROM SERVER TO CLIENT)

PHASE 3: HTTP+XML+SOAP+WSDL+UDDI
- CLIENT CAN BE HUMAN BEING OR PIECE OF SOFTWARE
- TWO WAY COMMUNICATION
- WEB SERVICES
WEB SERVICES

W3C STANDARDS

SHIP DATA – NO CODE

RPC

SUPPORTED BY ALL MAJOR VENDORS
MICROSOFT, SUN, IBM, APACHE, …
WEB SERVICES

VISION:
TECHNOLOGY BECOMES PART OF OFFICE PLATFORMS

DATABASES
- FETCH PERIODICALLY VALUES FROM REMOTE WEB SERVERS

SPREADSHEETS
- CELLS REPRESENT VALUES ON REMOTE WEB SERVERS

TEXT PROCESSORS
- TEXT INCLUDES DATA FROM REMOTE WEB SERVERS
WEB SERVICES - SOAP

SIMPLE OBJECT ACCESS PROTOCOL

“A lightweight and simple XML-based protocol to allow the exchange of structured and typed information across the Web” [SOAP]

LAYER ON TOP OF HTTP
WEB SERVICES - SOAP EXAMPLE

Client

stock name

stock value

Stockvalue Service
WEB SERVICES - SOAP EXAMPLE

Client

SOAP Message
XML document (stock name)

Stockvalue Service

SOAP Message
XML document (stock value)

http request (post)

http response

http request
(post)
WEB SERVICES - SOAP EXAMPLE

REQUEST:
<soap:Envelope>
  <soap:Body xmlns:m="http://www.stock.org/stock" />
  <m:GetStockPrice>
    <m:StockName>IBM</m:StockName>
  </m:GetStockPrice>
</soap:Body>
</soap:Envelope>

RESPONSE:
<soap:Envelope>
  <soap:Body xmlns:m="http://www.stock.org/stock" />
  <m:GetStockPriceResponse>
    <m:Price>34.5</m:Price>
  </m:GetStockPriceResponse>
</soap:Body>
</soap:Envelope>
WEB SERVICES - WSDL

WEB SERVICE DESCRIPTION LANGUAGE

“an XML format for describing network services as a set of endpoints operating on messages containing either document-oriented or procedure-oriented information.” [WSDL]

USEFUL FOR DEVELOPERS AS WELL AS APPLICATIONS
WEB SERVICES - WSDL EXAMPLE

Client

stock name

stock value

WSDL Server

Stockvalue Service
WEB SERVICES - WSDL

TYPES: a container for data type definitions using some type system
MESSAGE: an abstract, typed definition of the data being communicated.
OPERATION: an abstract description of an action supported by the service.
PORT TYPE: an abstract set of operations supported by one or more endpoints.
BINDING: a concrete protocol and data format specification for a particular port type.
PORT: a single endpoint defined as a combination of a binding and a network address.
SERVICE: a collection of related endpoints.
WEB SERVICES - UDDI

UNIVERSAL DESCRIPTION, DISCOVERY AND INTEGRATION

DIRECTORY WITH:
- INFORMATION ON WEB SERVICES
- WSDL DOCUMENTS

ACCESS VIA SOAP

USEFUL FOR END USERS
WEB SERVICES - UDDI EXAMPLE

- UDDI Server
- Client
- Stockvalue Service
- WSDL Server

Connections:
- UDDI Server to Client: stock name
- Client to Stockvalue Service: stock value
WEB SERVICES: SOME PROBLEMS

ACCESS CONTROL TO WEB SERVICES
(PASSPORT, LIBERTY ALLIANCE)

LACK OF TRANSACTIONS

Performance:
- Speed of parsing
- Caching of WSDL data
CONCLUSIONS

POTENTIAL BANDWIDTH CONSUMPTION HIGHER THEN MANY ENVISAGE

GPRS EXPENSIVE
WIRELESS WILL NOT REPLACE WIRED ACCESS

IP WILL BE THE MAIN NETWORK PROTOCOL

ON TOP OF IP, WEB SERVICES SEEM TO BECOME THE MIDDLEWARE TECHNOLOGY OF CHOICE

WEB SERVICE TECHNOLOGY STILL UNDER DEVELOPMENT
SOME PROJECT IDEAS

STARTING POINT:
THERE WILL BE A MIXTURE OF NETWORKS

UMTS PROVIDER A  FIXED PROVIDER A  FIXED PROVIDER B  802.11 PROVIDER C
THE PROBLEM IS NOW ...

HOW TO CONTROL THE COOPERATION BETWEEN THESE NETWORKS?

• QoS “GUARANTEES”
  END-TO-END MECHANISMS ARE TECHNICALLY NOT FEASABLE

• ACCOUNTING
  STANDARDIZATION BODIES WILL NOT AGREE ON A SINGLE MECHANISM

• SECURITY
  PROVIDERS WILL SELECT DIFFERENT OPTIONS
THE SOLUTION IS ...

CREATE OPEN CONTROL INTERFACES

UMTS PROVIDER A

FIXED PROVIDER A

FIXED PROVIDER B

802.11 PROVIDER C
APPROACHES THUSFAR

TINA & CORBA (OMG)

OSA (3GPP)

PARLAY

CMIP/CMIS/GDMO/… (ISO)

SNMP (IETF)

C7 (ITU)
THESE APPROACHES WON’T WORK

OFTEN TOO COMPLEX
SOLUTIONS FOR SPECIFIC TECHNOLOGIES

NO ONE ACCEPTABLE FOR ALL

• TINA/CORBA FOR CONTROLLING IP TECHNOLOGY?
• PARLAY/OSA FOR CONTROLLING IP TECHNOLOGY?
WHICH APPROACH COULD WORK?

- SIMPLE TO UNDERSTAND
- SIMPLE TO IMPLEMENT
- UBIQUITY

WEB SERVICES