

INF105 - 10
HTTP

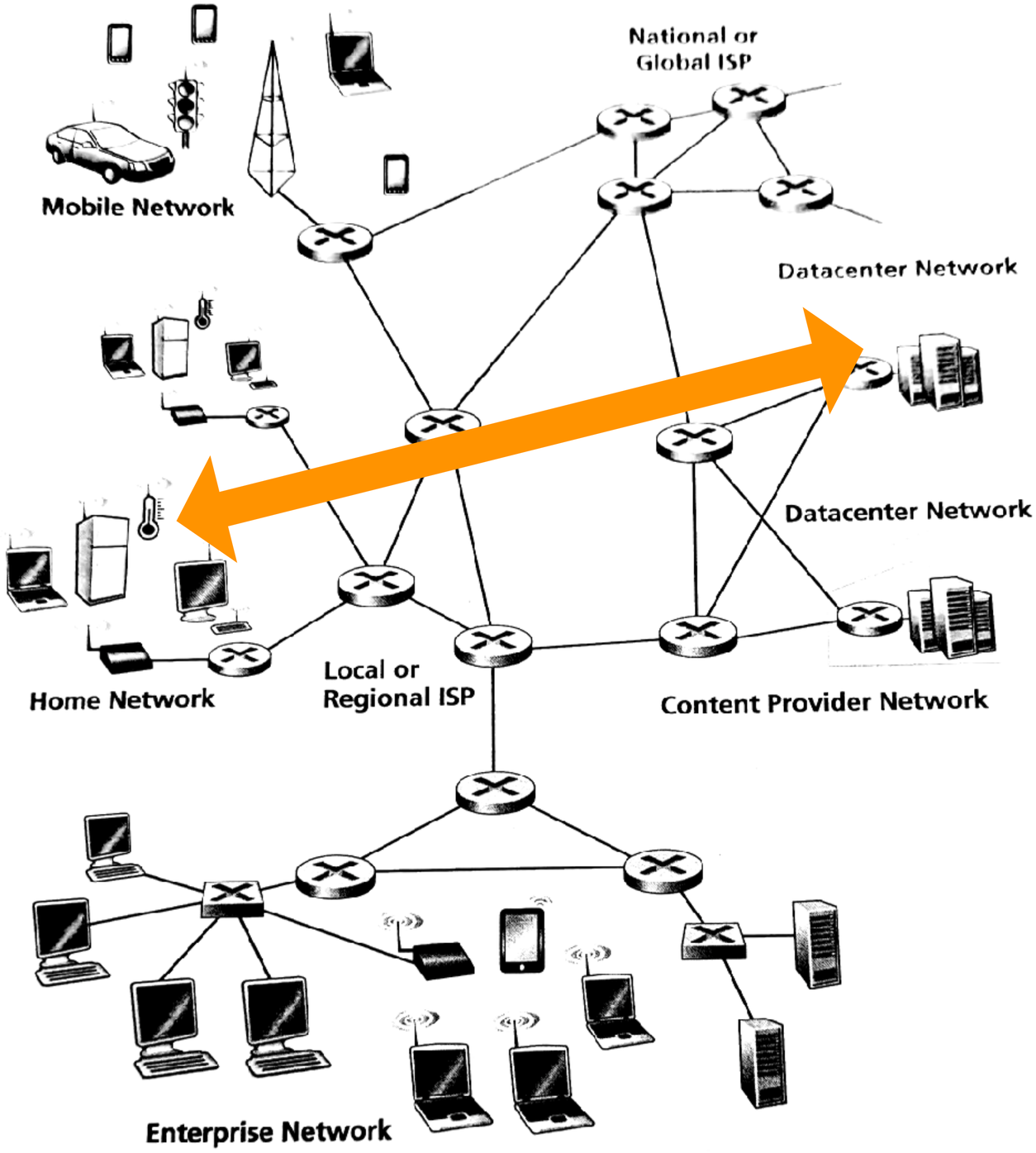
David Grellscheid

5-layer model

- **Application**: HTTP, SMTP, FTP, SSH, DNS, ...
- Transport: TCP / UDP
- Network: IP
- Link: Ethernet, WiFi, PPP
- Physical

Application layer
virker end-to-end

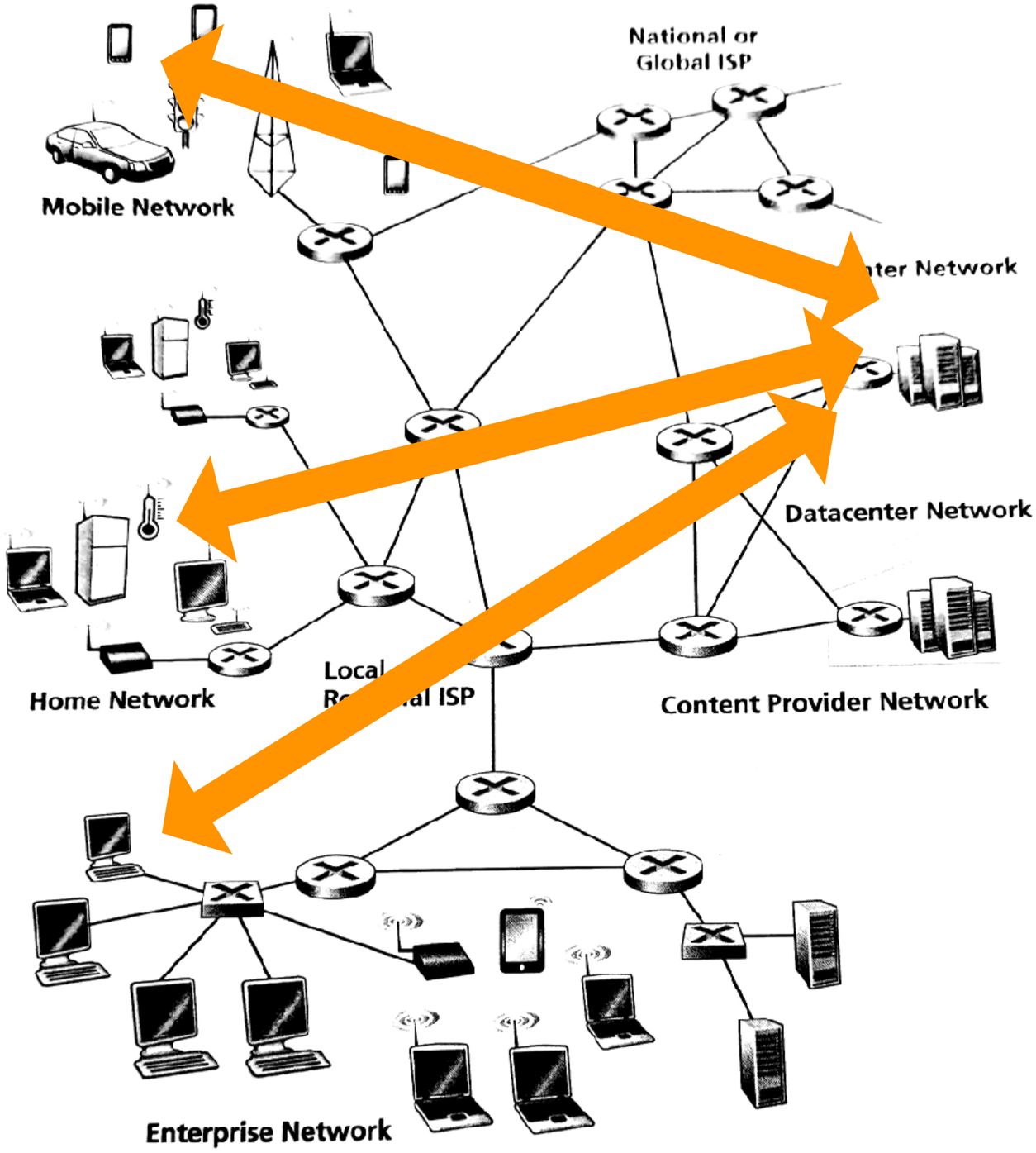
vi antar at lavere
lag har gjort sin del



Kurose/Ross,
"Computer Networking,
a top-down approach",
Pearson 2022

de fleste protokollene er **client-server**

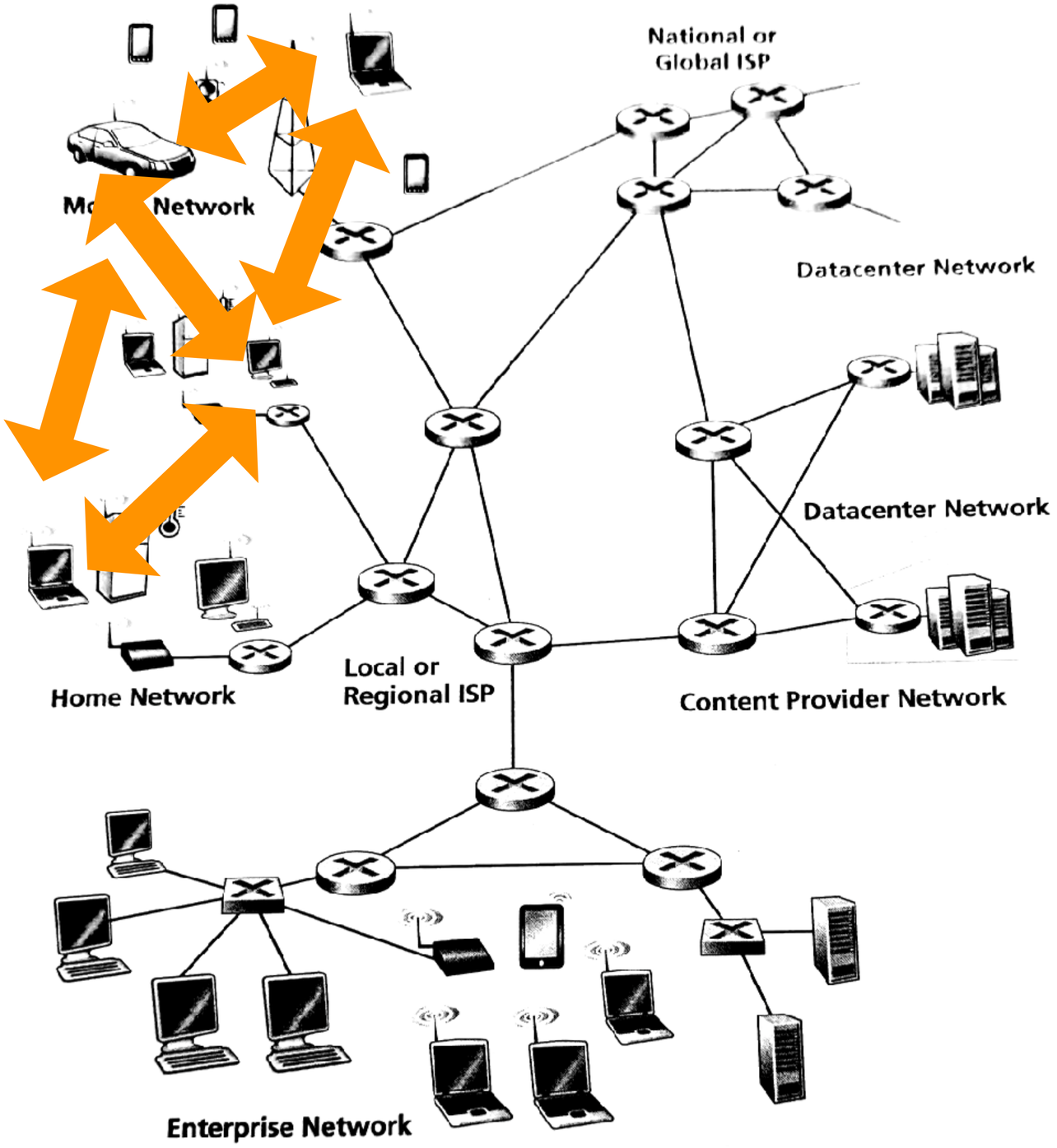
HTTP, DNS, SSH, ...



Kurose/Ross, "Computer Networking, a top-down approach", Pearson 2022

peer-to-peer
applikasjoner

VoIP, torrents,
Steam (delvis)



Kurose/Ross,
"Computer Networking,
a top-down approach",
Pearson 2022

- Application: **HTTP**, SMTP, FTP, SSH, DNS, ...
- Transport: TCP / UDP
- Network: IP
- Link: Ethernet, WiFi, PPP
- Physical

Ideen: mars 1989

CERN DD/OC

Tim Berners-Lee, CERN/DD

Information Management: A Proposal

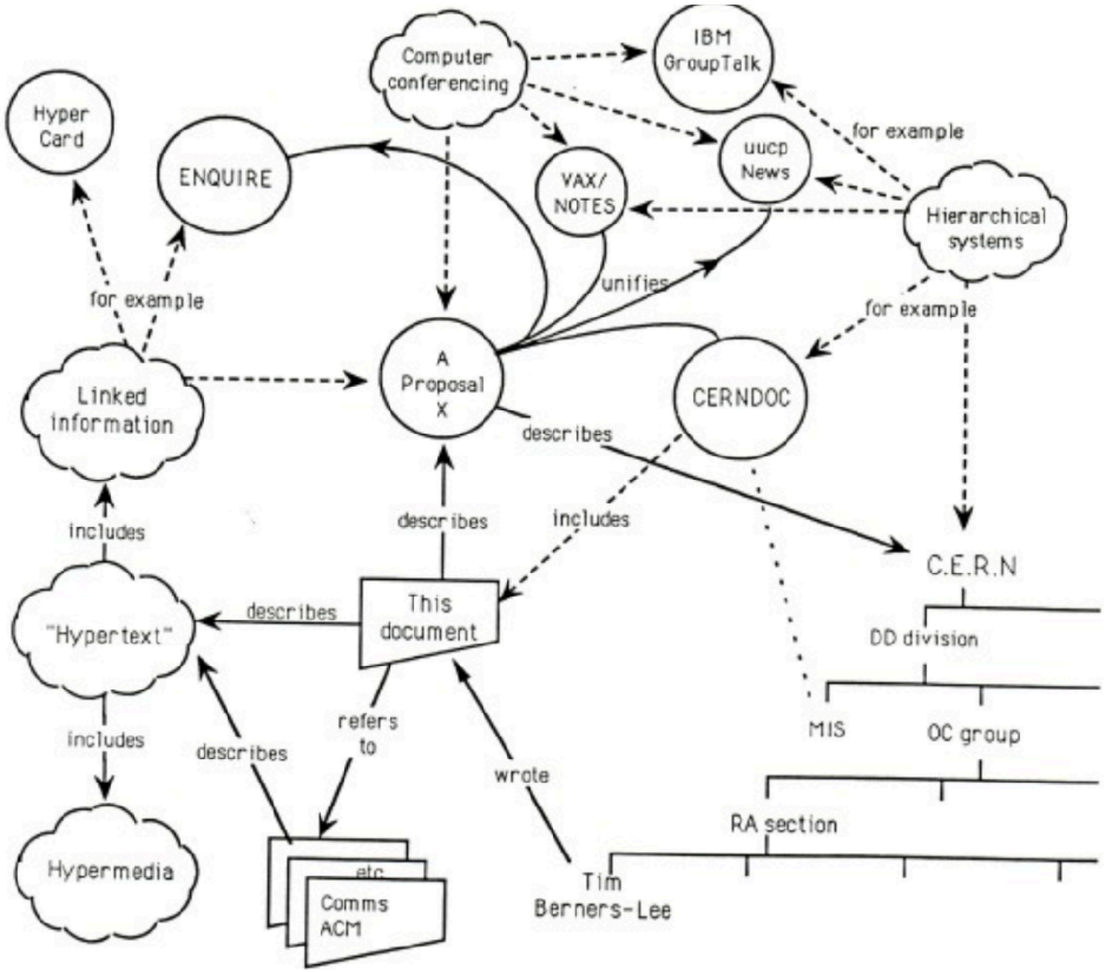
March 1989

Information Management: A Proposal

Abstract

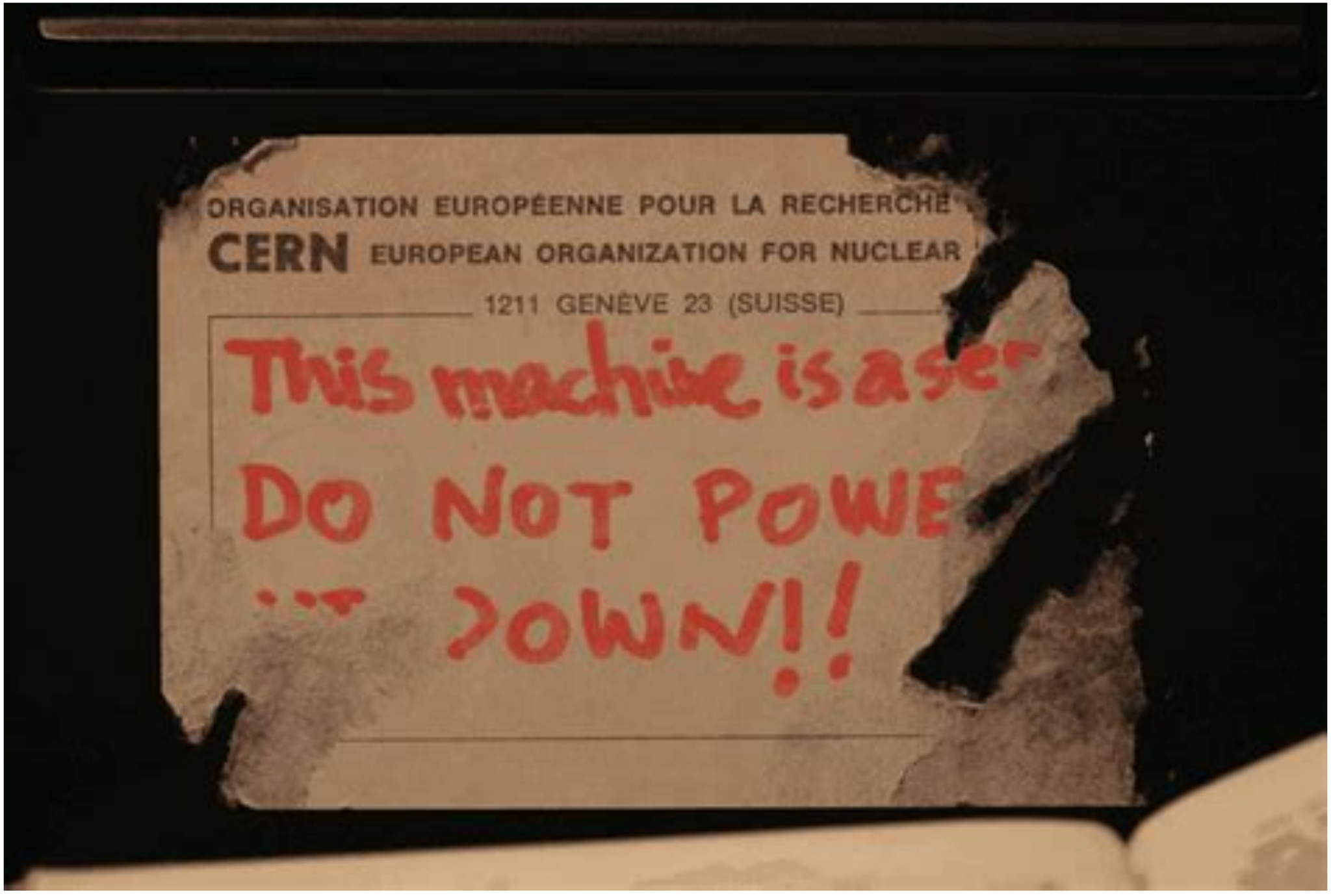
This proposal concerns the management of general information about accelerators and experiments at CERN. It discusses the problems of loss of information about complex evolving systems and derives a solution based on a distributed hypertext sytstem.

Keywords: Hypertext, Computer conferencing, Document retrieval, Information management, Project control



https://home.cern/science/computing/the-birth-of-the-web/short-history-web/




ORGANISATION EUROPÉENNE POUR LA RECHERCHE
CERN EUROPEAN ORGANIZATION FOR NUCLEAR
1211 GENÈVE 23 (SUISSE)
This machine is a se
DO NOT POWE
DOWN!!

https://info.cern.ch/hypertext/WWW/TheProject.html

World Wide Web

The WorldWideWeb (W3) is a wide-area hypermedia information retrieval initiative aiming to give universal access to a large universe of documents.

Everything there is online about W3 is linked directly or indirectly to this document, including an executive summary of the project, Mailing lists , Policy , November's W3 news , Frequently Asked Questions .

What's out there?
: Pointers to the world's online information, subjects , W3 servers, etc.

Help
: on the browser you are using

Software Products
: A list of W3 project components and their current state. (e.g. Line Mode ,X11 Viola , NeXTStep , Servers , Tools , Mail robot , Library)

Technical
: Details of protocols, formats, program internals etc

Bibliography
: Paper documentation on W3 and references.

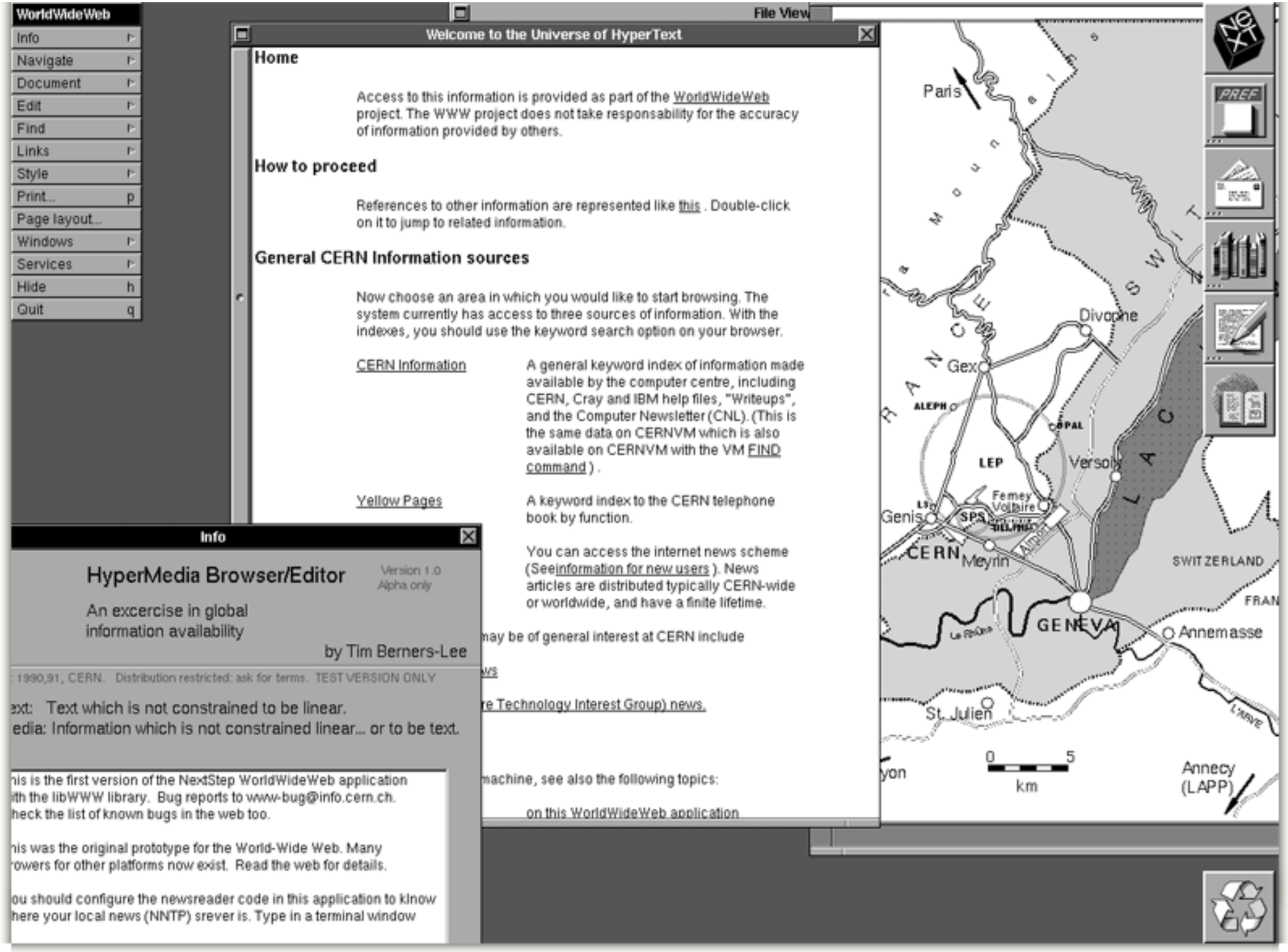
People
: A list of some people involved in the project.

History
: A summary of the history of the project.

How can I help ?
: If you would like to support the web..

Getting code
: Getting the code by anonymous FTP , etc.

1991



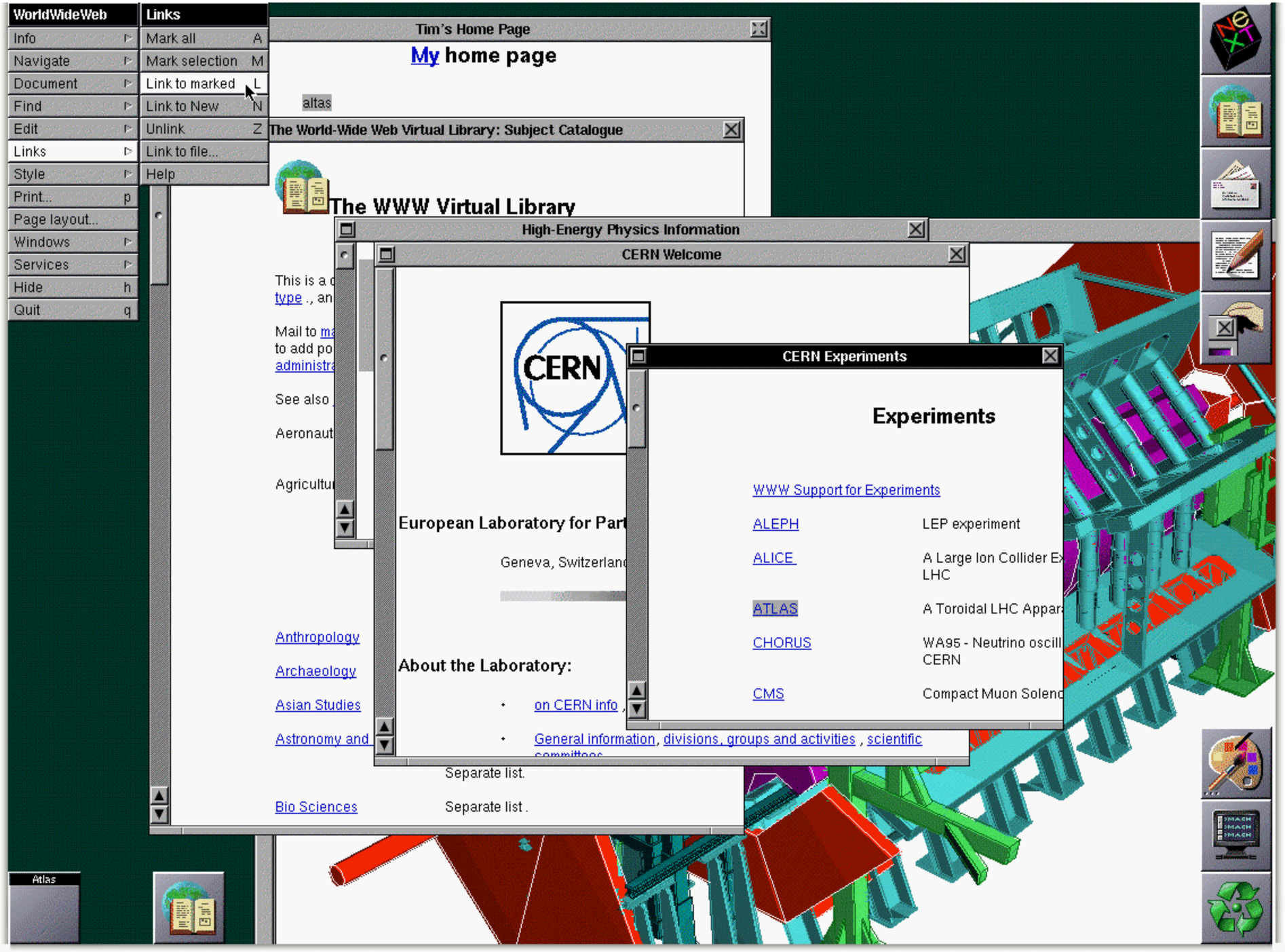
https://info.cern.ch/NextBrowser.html



1991

https://info.cern.ch/NextBrowser.html

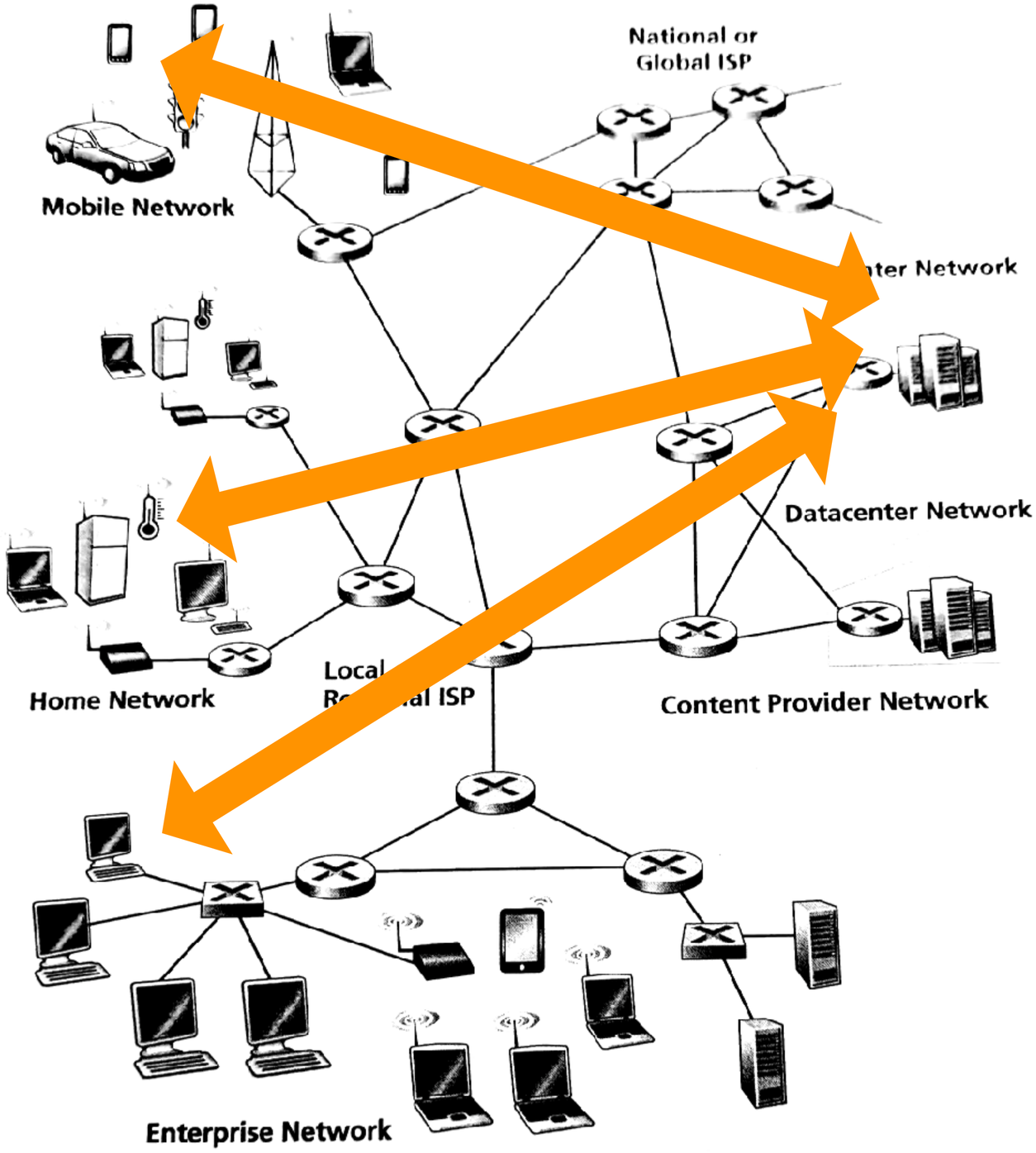
1993



https://info.cern.ch/NextBrowser1.html

Tidlig beskrivelse av HTTP client-server protokoll:

https://info.cern.ch/hypertext/WWW/Protocols/HTTP/AsImplemented.html



Kurose/Ross, "Computer Networking, a top-down approach", Pearson 2022

Client

- Grafisk web browser: Firefox, Vivaldi, Safari, ...
- Tekstbasert browser: w3m, lynx, ...
- Kommandlolinje-verktøy: curl, wcurl, wget
- Biblioteker til bruk i programmer: Python: requests, urllib. C: libcurl
- manuelt med f.eks nc

Server

- mange ulike implementasjoner, tilpasset formål
- store, fleksible: nginx, apache, ...
- lette: lighthttpd, ...
- Biblioteker til bruk i programmer:
  Python http.server, ...

en URL

uniform resource locator

http:// www.inf105.org /lab04/index.html

Protokoll:

http
https
ftp
gopher
...

en URL

uniform resource locator

http:// www.inf105.org /lab04/index.html

Server:

domenenavn
ip-adresse
host:port

en URL

uniform resource locator

http:// www.inf105.org /lab04/index.html

Ressurs:

mappe-sti til en fil

serveren ofte tolker den internt:

rewrites

navn til et generert ressurs
(dynamiske nettsider)

Client

Server listens on 158.39.201.59 port 80



TCP/IP sets up the link

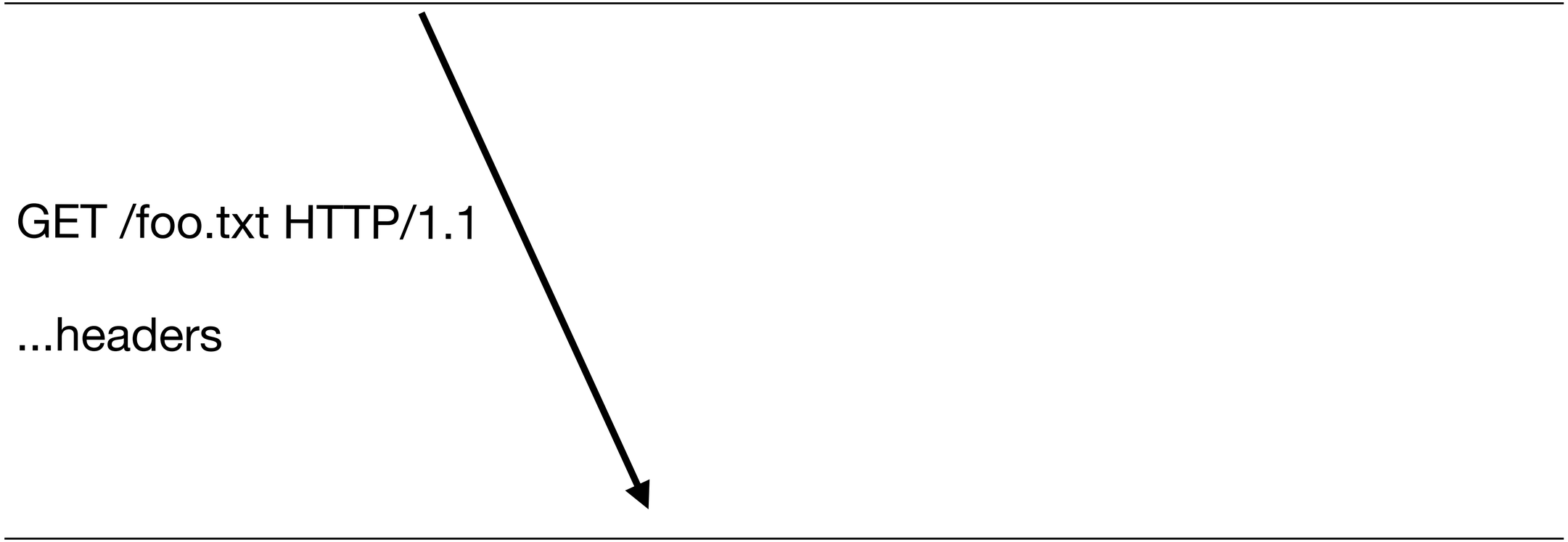
Client: local port 12345 connected

Server connected on 158.39.201.59 port 80



Send GET request

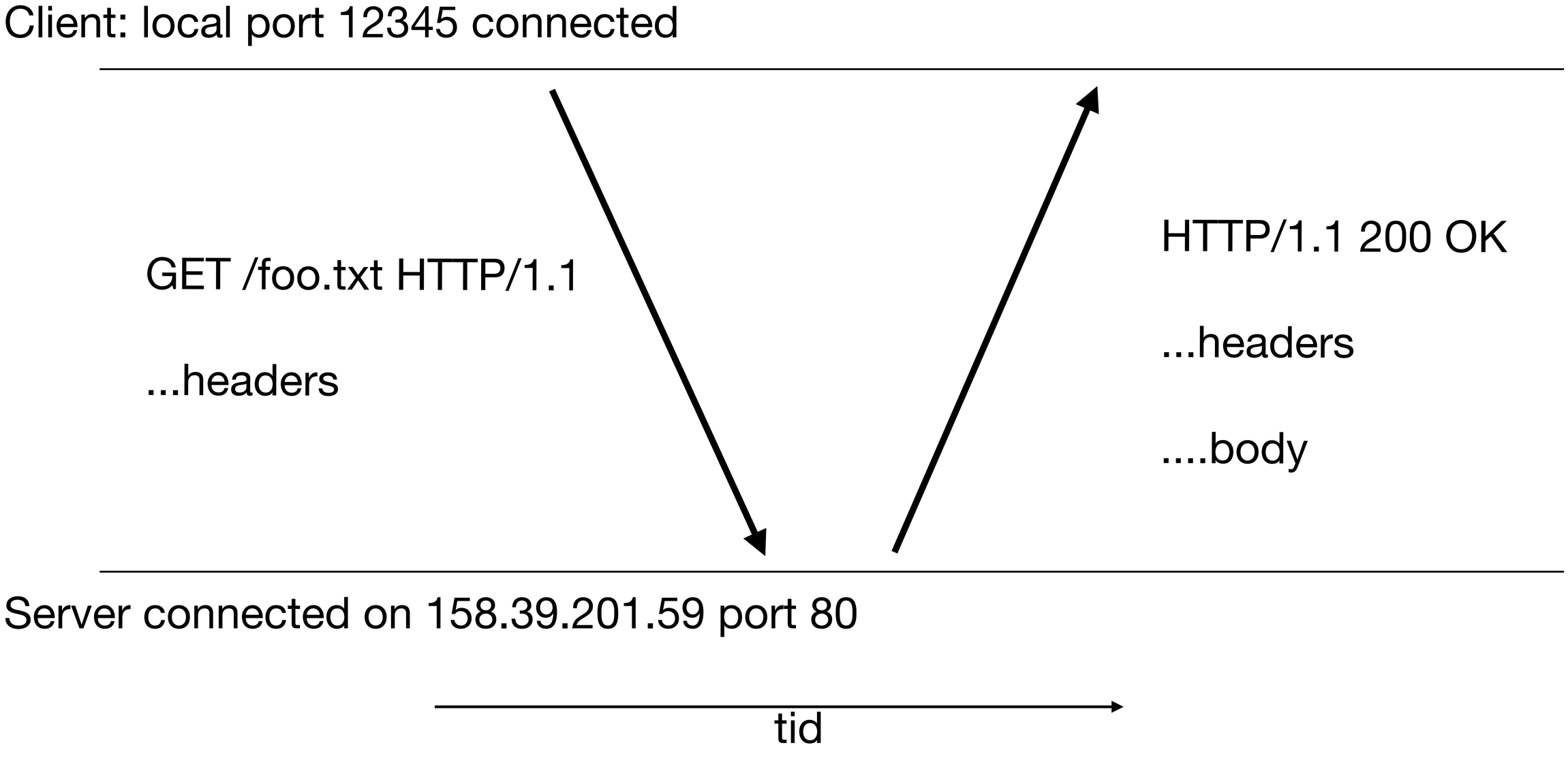
Client: local port 12345 connected



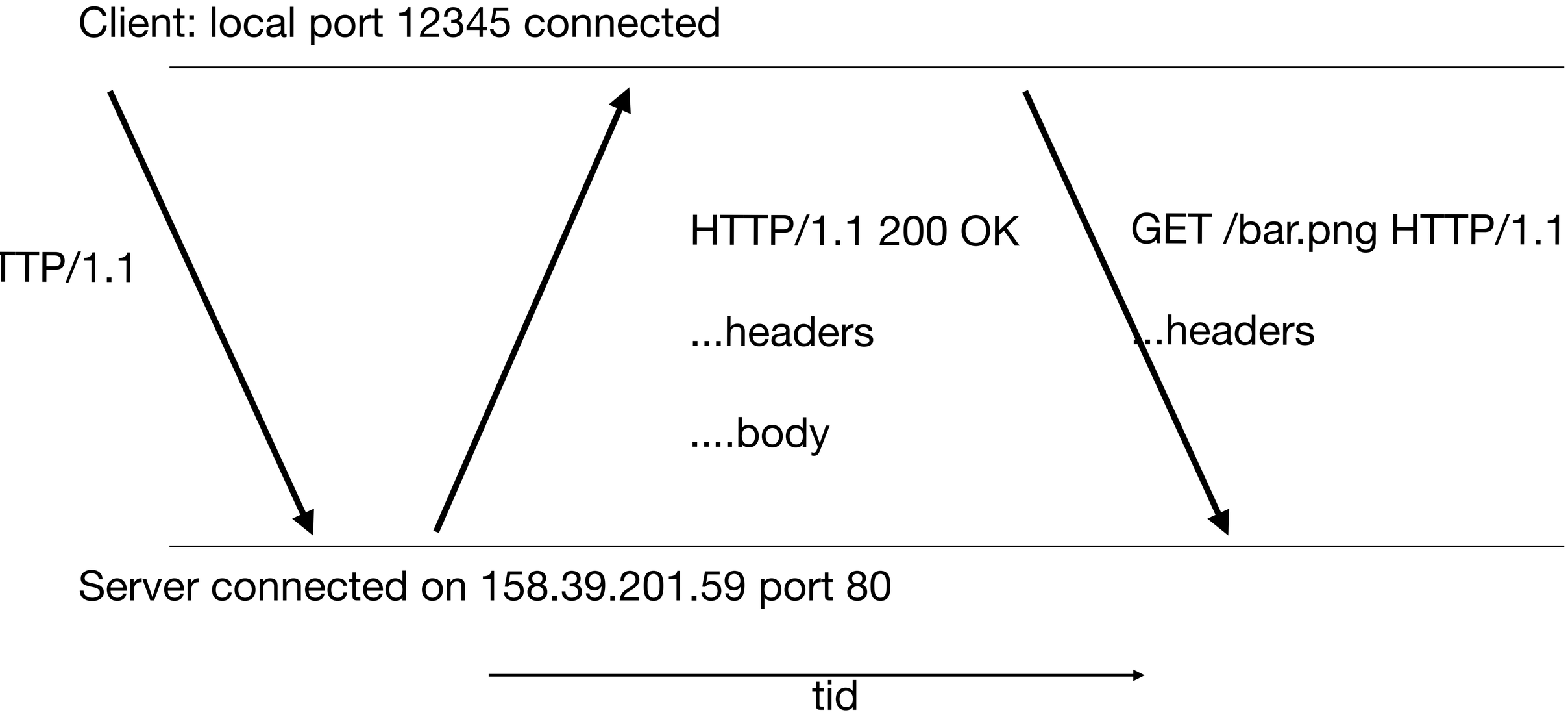
Server connected on 158.39.201.59 port 80

tid

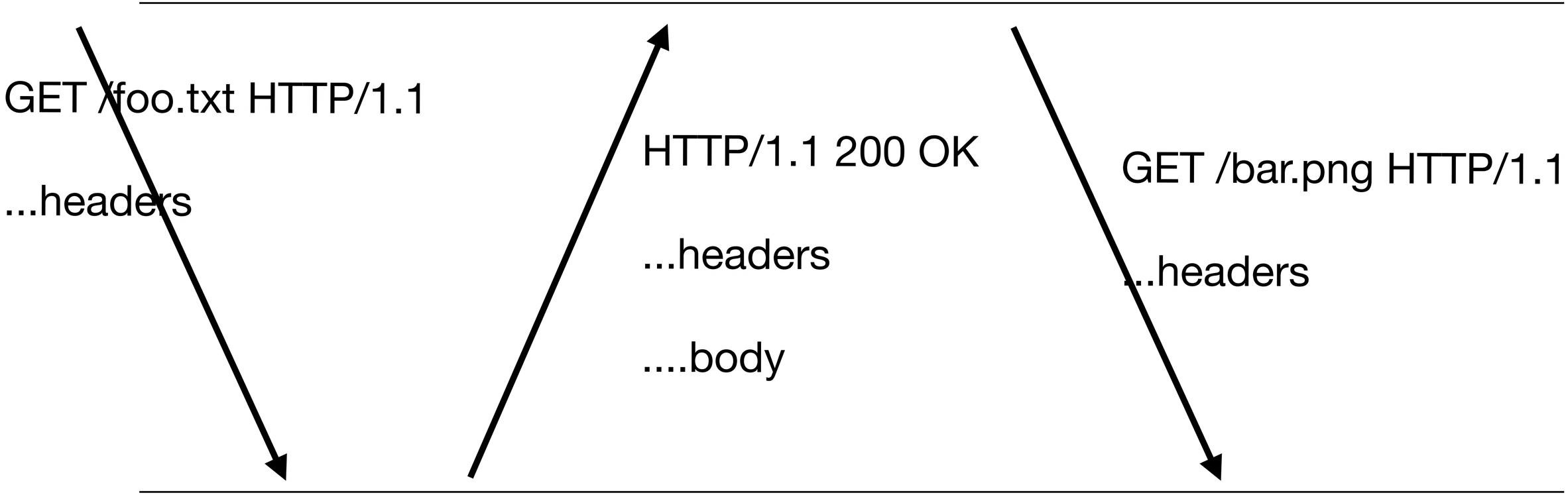
Receive OK


Client: local port 12345 connected
GET /foo.txt HTTP/1.1
...headers
HTTP/1.1 200 OK
...headers
....body
Server connected on 158.39.201.59 port 80
tid

Send neste GET



Request - Response design



Client request

https://developer.mozilla.org/en-US/docs/Web/HTTP/Reference/Methods

- Struktur:

  VERB ressursnavn HTTP/version [f.eks GET, POST]
  Header1: blah [f.eks Host:, Accept:]
  Header2: blah

  [tom linje]
  Content [ikke alle requests har content]

Client requests - GET

https://developer.mozilla.org/en-US/docs/Web/HTTP/Reference/Methods

- GET /foobar.html HTTP/1.1
  Host: www.inf105.org
  User-Agent: curl/8.6.0
  Accept: */*
  [ingen content!]

- skal hente en ressurs, skal ikke endre noe på serveren

Client requests - HEAD

https://developer.mozilla.org/en-US/docs/Web/HTTP/Reference/Methods

- HEAD /foobar.html HTTP/1.1
  Host: www.inf105.org
  User-Agent: curl/8.6.0
  Accept: */*
  [ingen content!]

- likt GET, men vi skal ikke ha content tilbake, bare headers

Client requests - POST

https://developer.mozilla.org/en-US/docs/Web/HTTP/Reference/Methods

- POST /test HTTP/1.1
  Host: example.com
  Content-Type: application/x-www-form-urlencoded
  Content-Length: 27

  field1=value1&field2=value2

- POST sender data til en server,
  endrer noe på server-side

Server response

- Struktur:

  HTTP/version statuskode [f.eks 200, 404, 302]
  Header1: blah [f.eks Content-Type:, Content-Length]
  Header2: blah

  [tom linje]

  Content [ikke alle responses har content]

- `$ nc 158.39.201.59 80`

nc lager TCP forbindelse til server

- ```
  GET / HTTP/1.1
  Host: www.inf105.org
  ```

Klient GET request

- ```
  HTTP/1.1 200 OK
  Server: nginx
  Date: Wed, 16 Sep 2026 10:29:56 GMT
  Content-Type: text/html
  Content-Length: 2642
  Last-Modified: Thu, 10 Sep 2026 13:19:56 GMT

  <!doctype html>
  <html lang="nb">
    <head>
  [...]
  ```

Server response

- `$ nc 158.39.201.59 80`

nc lager TCP forbindelse til server

- ```
  GET /foobar.txt HTTP/1.1
  Host: www.inf105.org
  ```

Klient GET request

- ```
  HTTP/1.1 404 Not Found
  Server: nginx
  Date: Wed, 16 Sep 2026 10:34:28 GMT
  Content-Type: text/html
  Content-Length: 146

  <html>
  <head><title>404 Not Found</title></head>
  <body>
  <center><h1>404 Not Found</h1></center>
  <hr><center>nginx</center>
  </body>
  </html>
  ```

Server response

Status codes

https://developer.mozilla.org/en-US/docs/Web/HTTP/Reference/Status

- Informational responses (100 – 199)
- Successful responses (200 – 299)
- Redirection messages (300 – 399)
- Client error responses (400 – 499)
- Server error responses (500 – 599)

Status codes - eksempler

https://developer.mozilla.org/en-US/docs/Web/HTTP/Reference/Status

- Successful responses (200 – 299)
  - 200 OK
- Redirection messages (300 – 399)
  - 301 Moved Permanently
  - 302 Found [temporary redirect]

Status codes - eksempler

https://developer.mozilla.org/en-US/docs/Web/HTTP/Reference/Status

- Client error responses (400 – 499)
  - 404 Not Found
  - 403 Forbidden
  - 451 Unavailable for legal reasons (Ray Bradbury, "Fahrenheit 451")
- Server error responses (500 – 599)
  - 500 Internal Server Error