Interactive Web-based Analysis Clients using AJAX: examples for CMS, ROOT and GEANT4

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What is AJAX?

What AJAX is not...

What AJAX is not...

What AJAX is not...

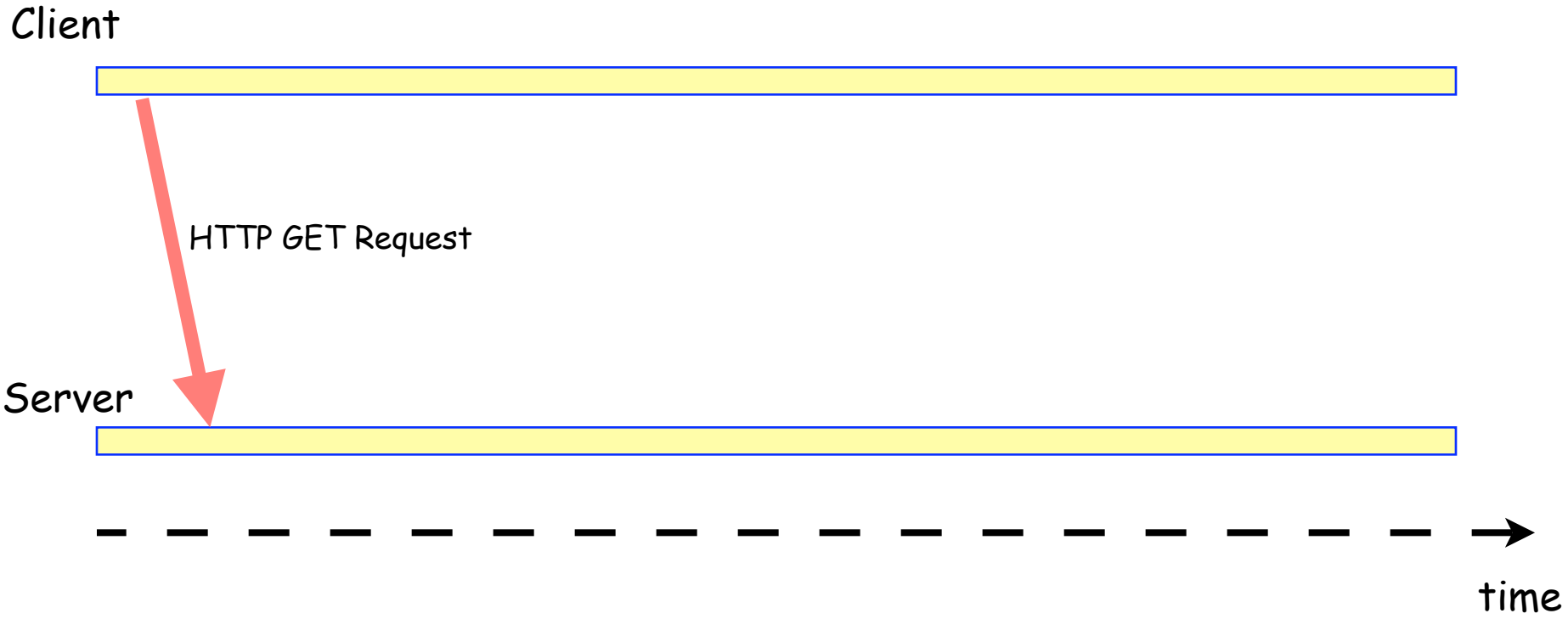
Asynchronous Javascript And XML

AJAX

AJAX is a buzz-word used to indicate a set of techniques and programming patterns, involving Javascript and XML, which allow to create web applications that give the same feel and responsiveness of traditional desktop applications.

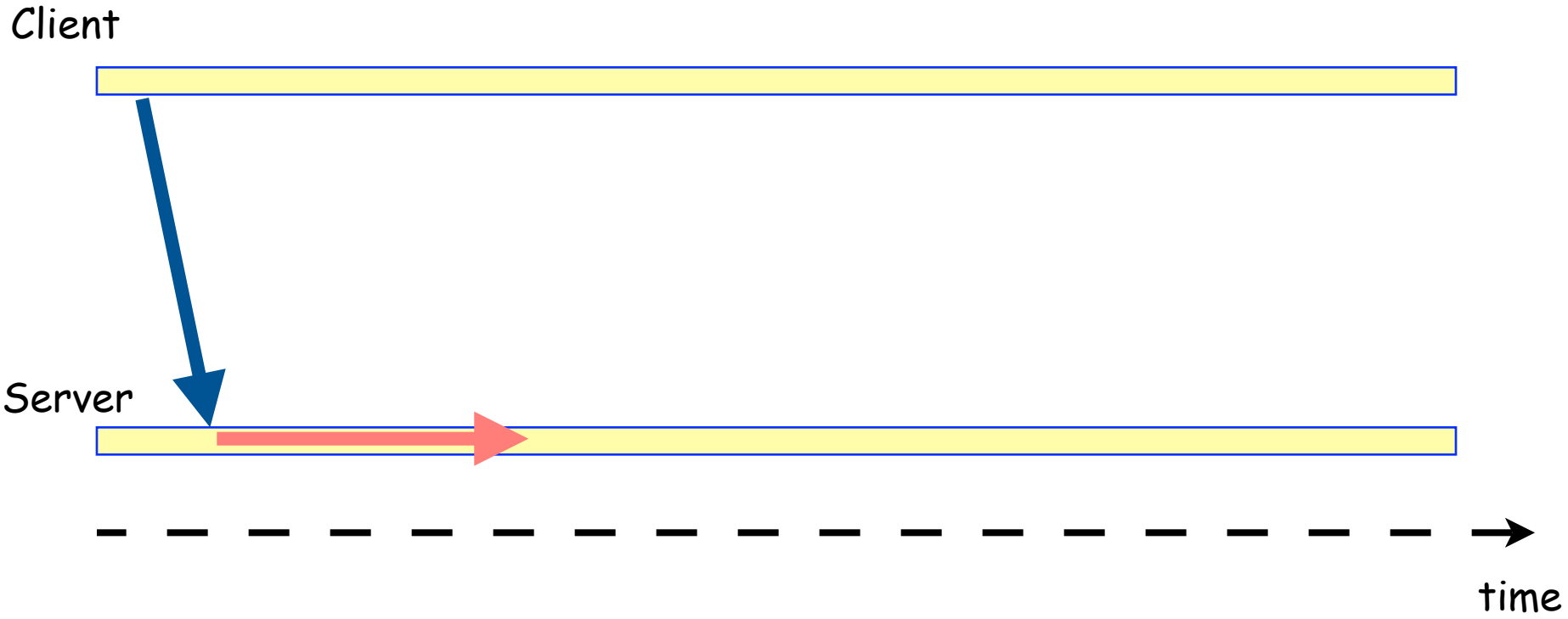
Traditional web pages workflow

The client does an HTTP GET Request to the server



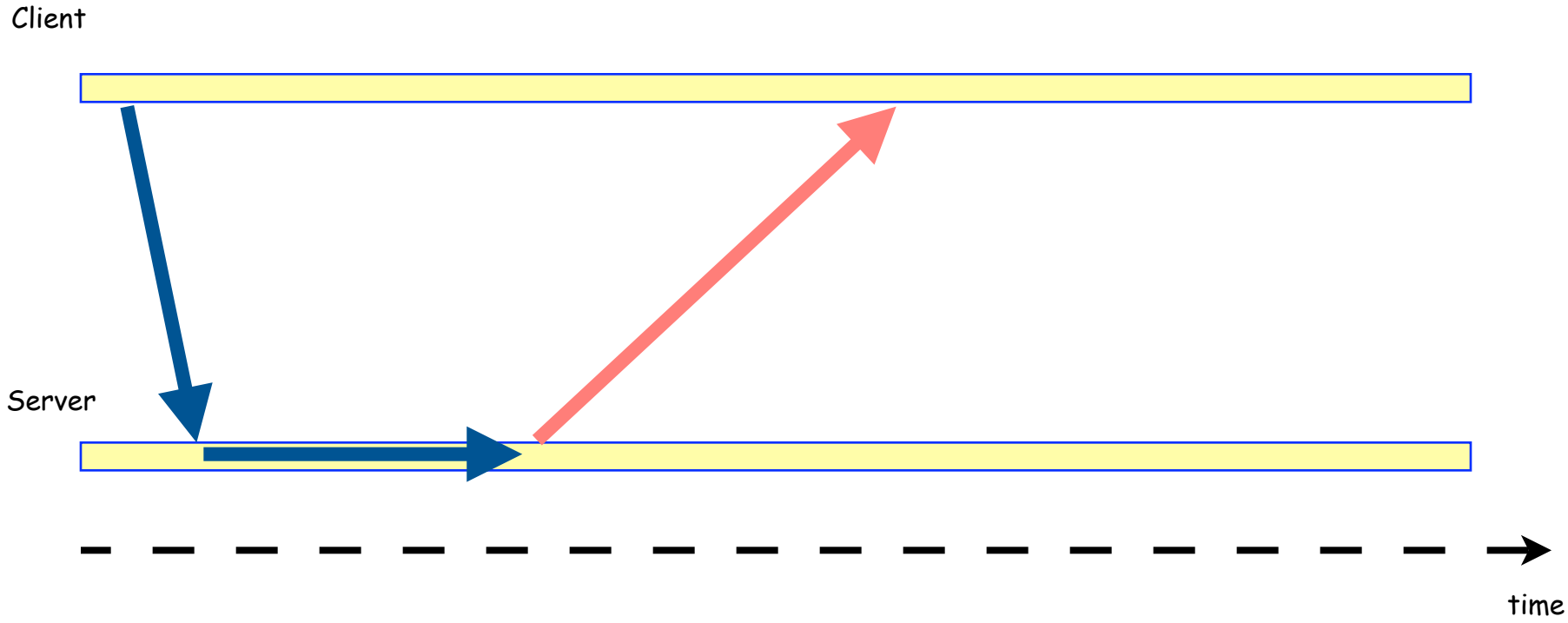
Traditional web pages workflow

The server constructs the full web page



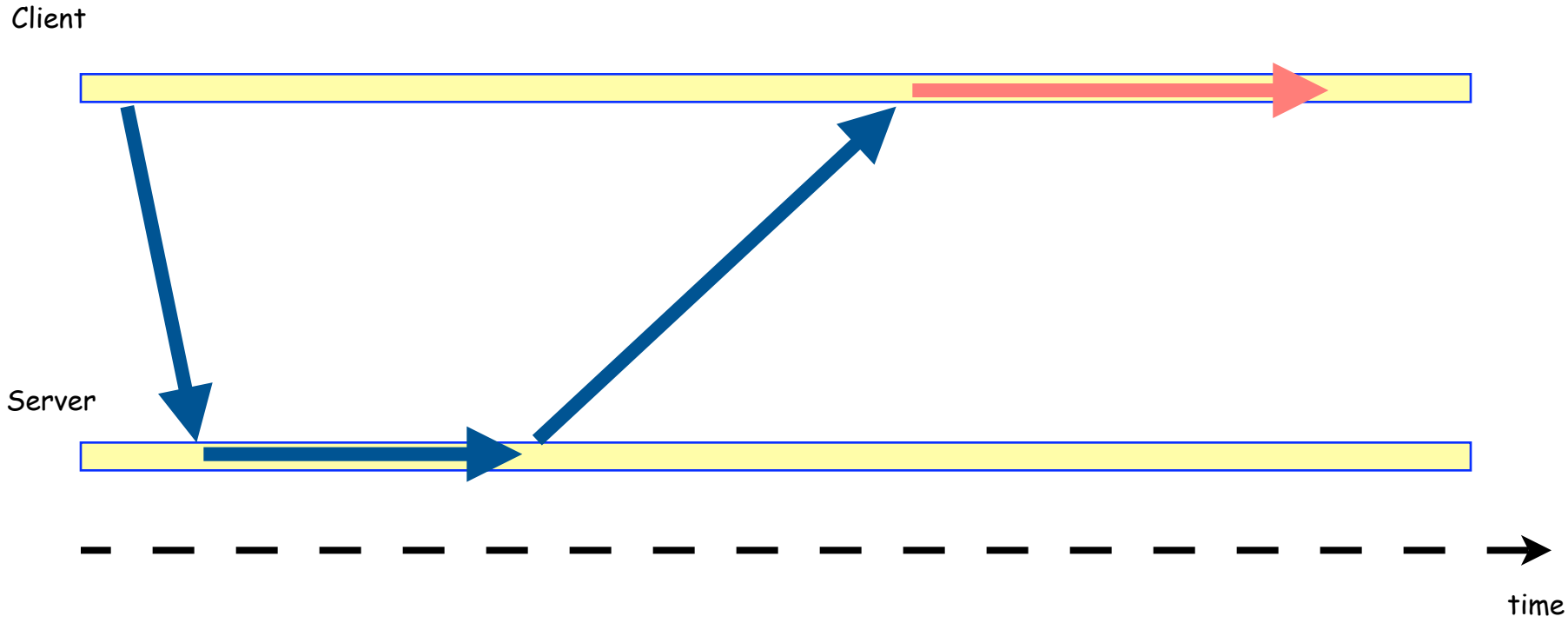
Traditional web pages workflow

The full page is sent...



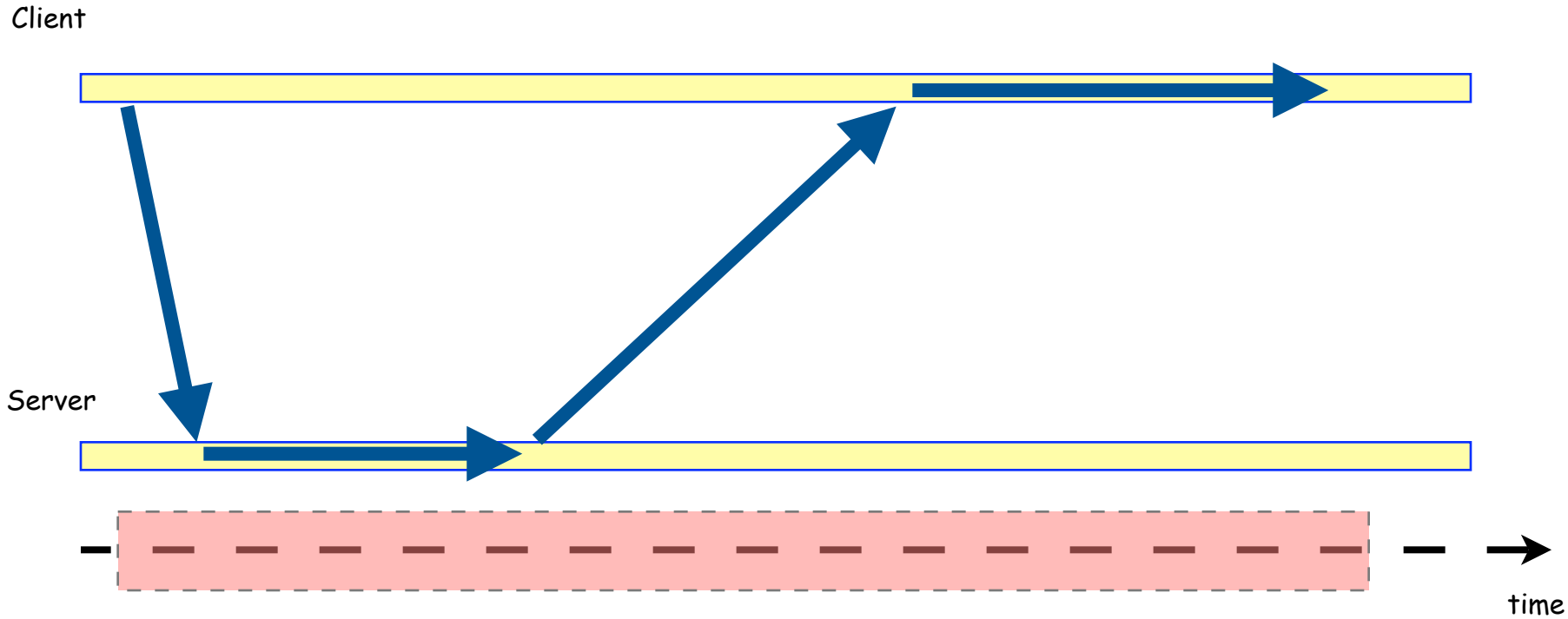
Traditional web pages workflow

...and processed by the client...



Traditional web pages workflow

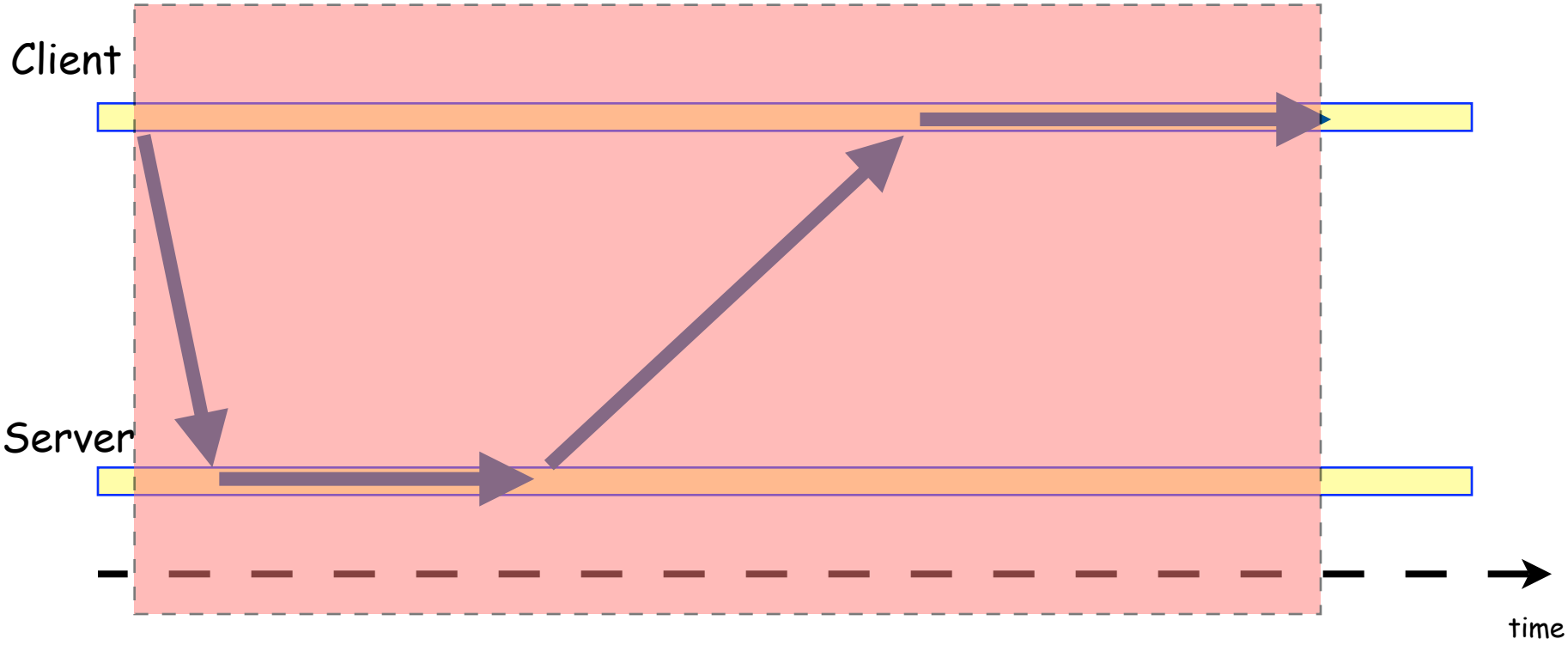
If the complete web page is complex enough, a big interval of time intercours between request for a page and its actual availability to the user



Big latency!

Traditional web pages workflow

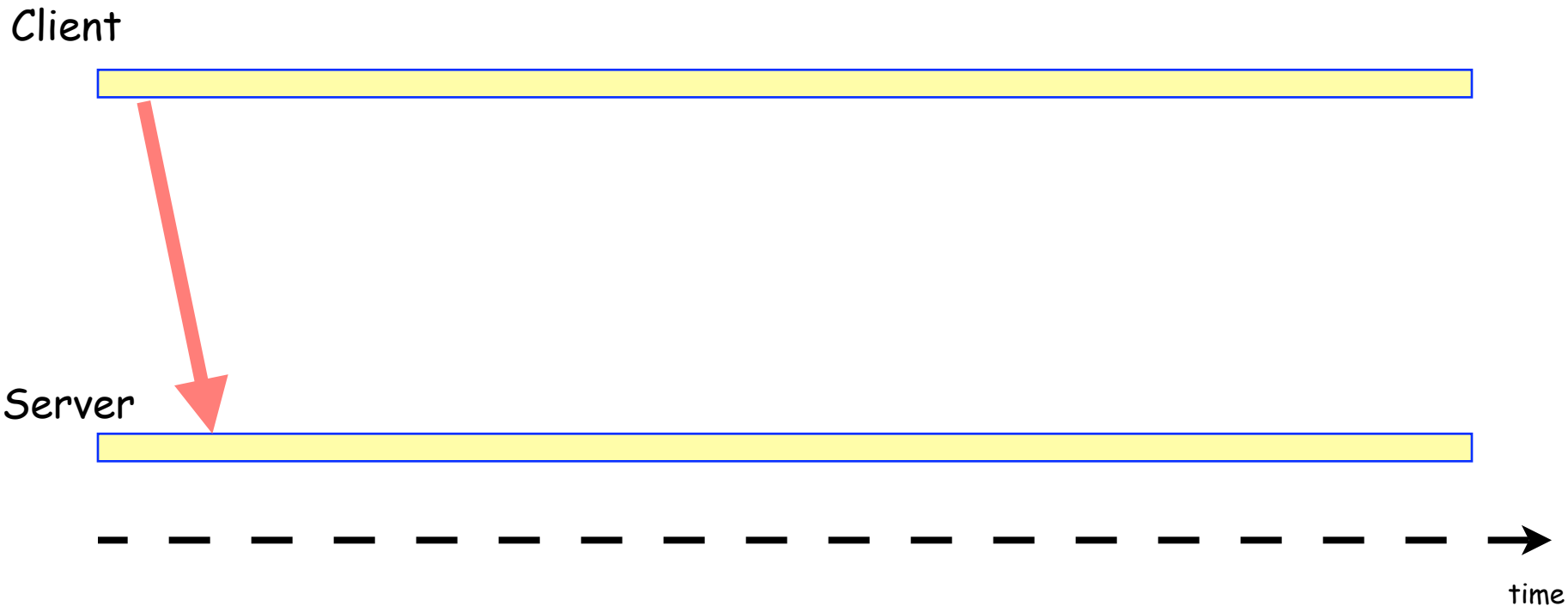
moreover the user cannot use the web page until fully loaded.



Period the web page is unavailable to the user

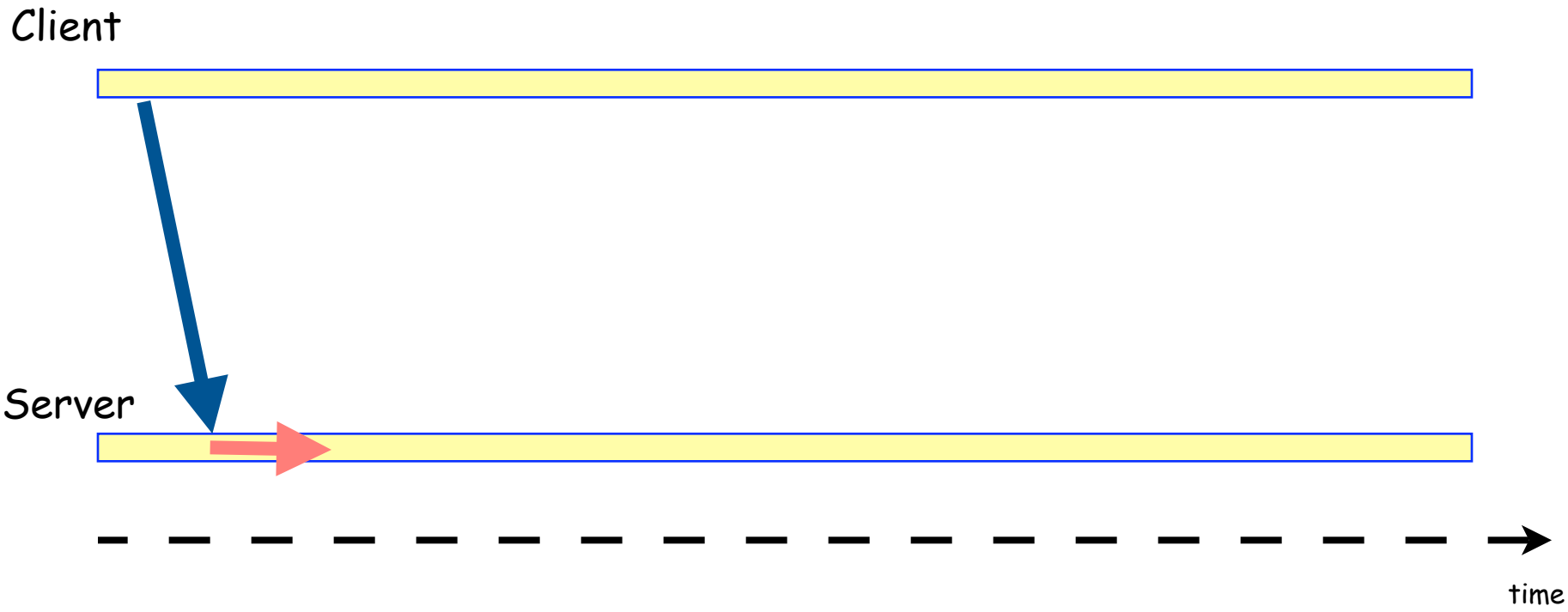
AJAX

The client does an HTTP GET Request to the server



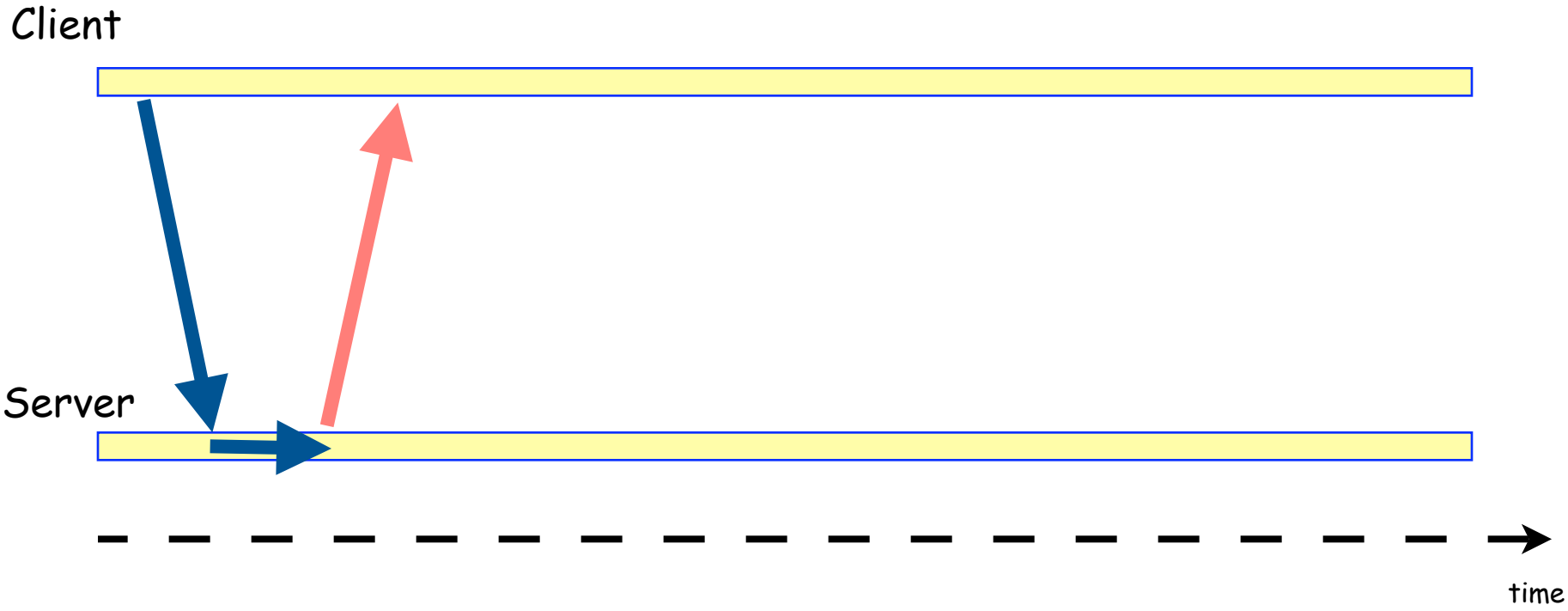
AJAX

The server constructs the minimal web page for the user to start browsing



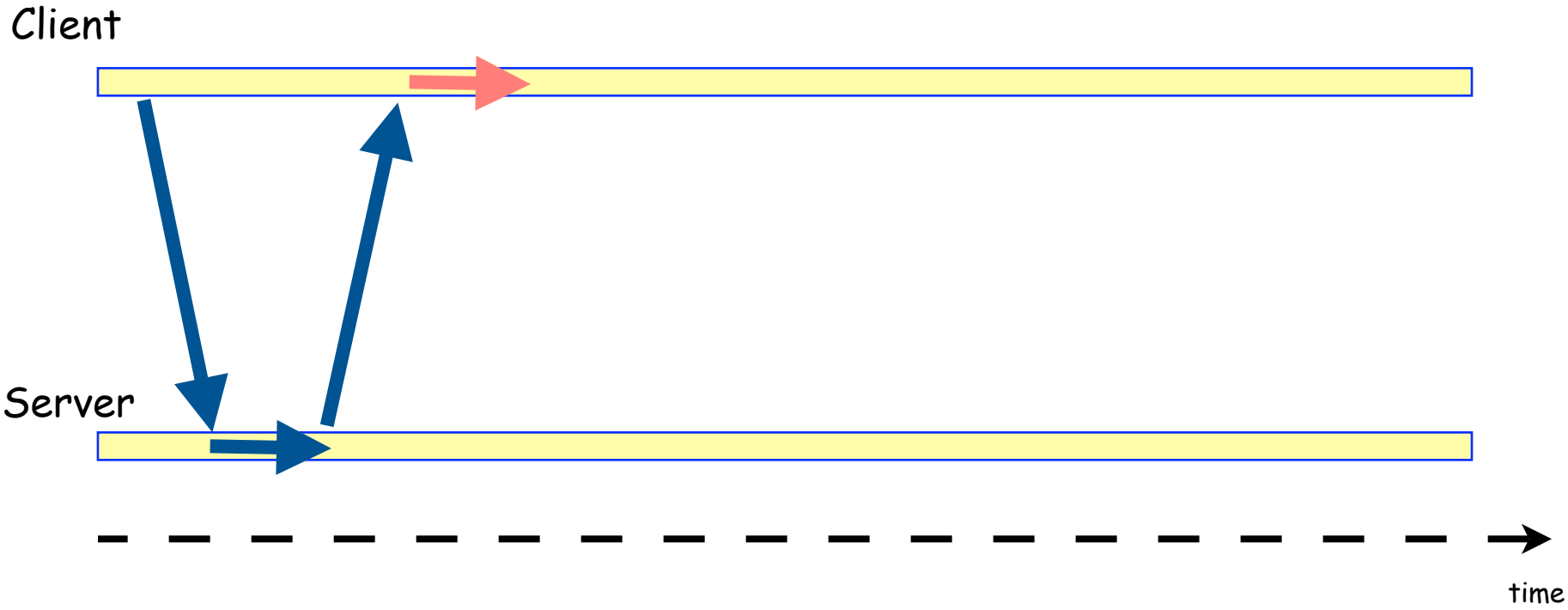
AJAX

The minimal page is sent



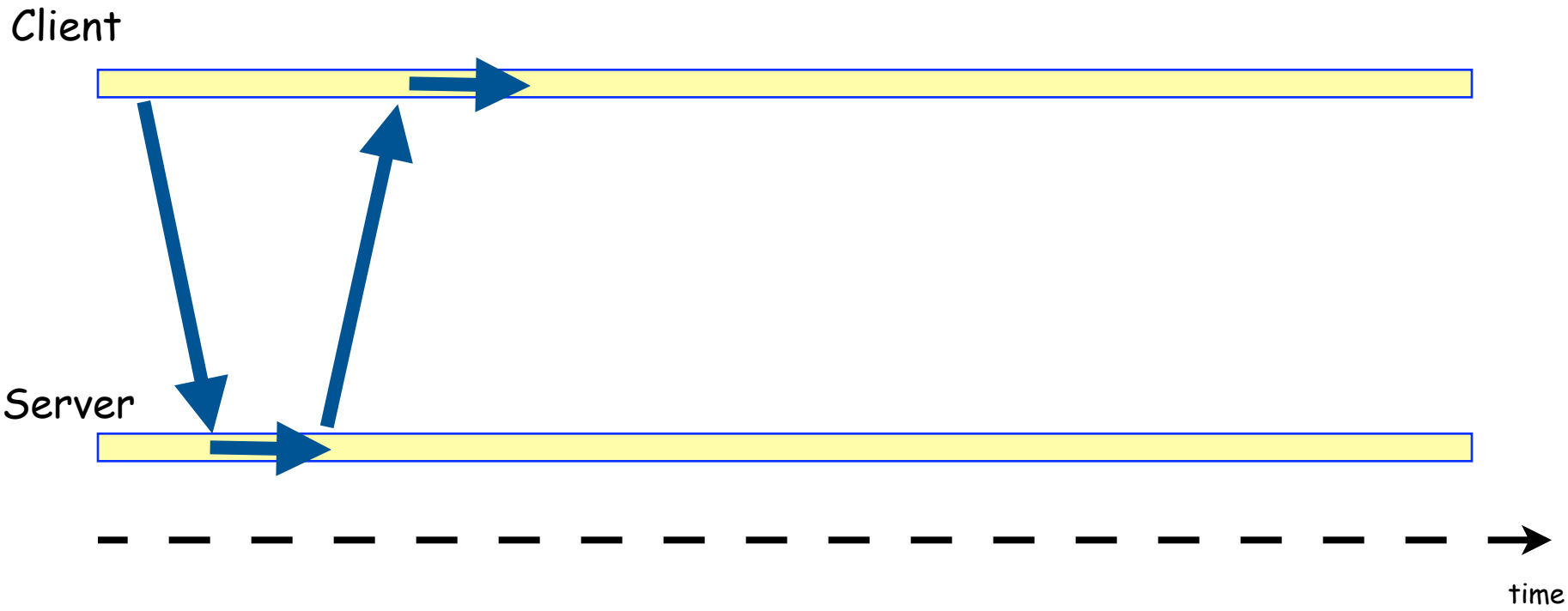
AJAX

The client processes the web page



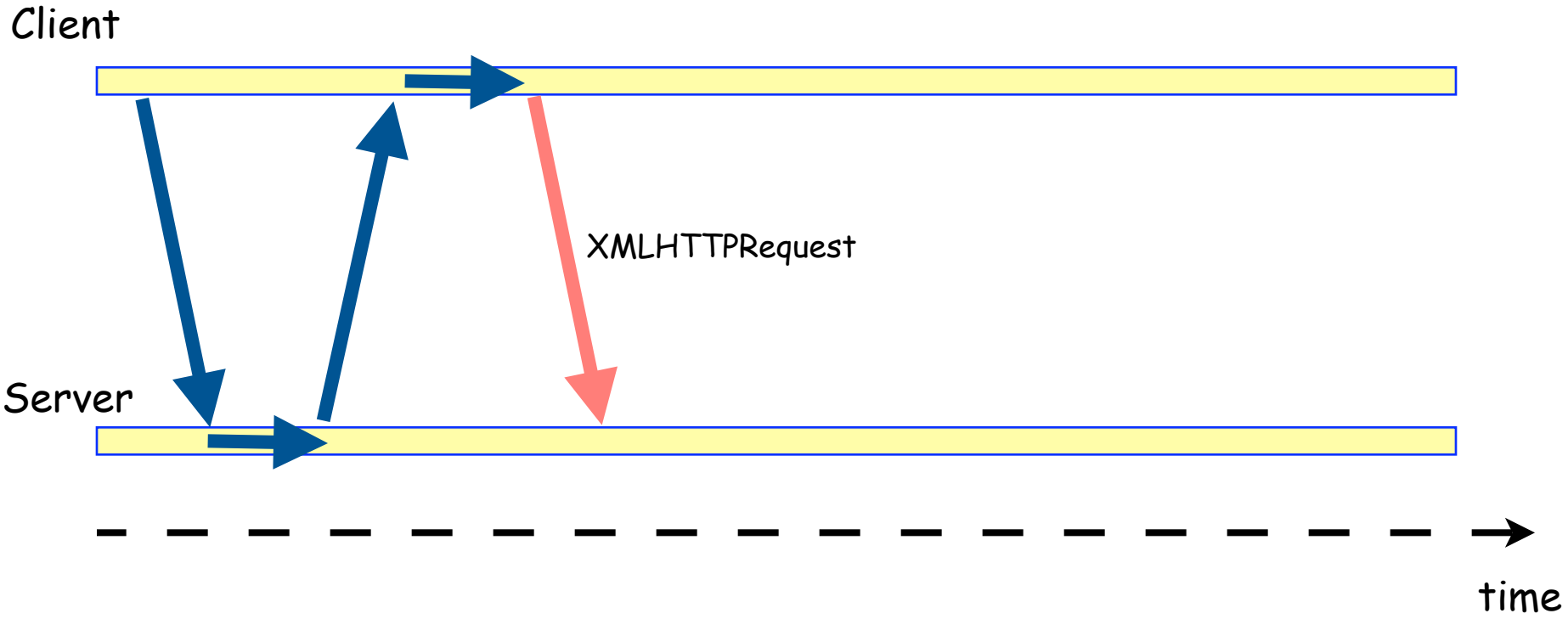
AJAX

...if (and only if) more information is requested by the user....



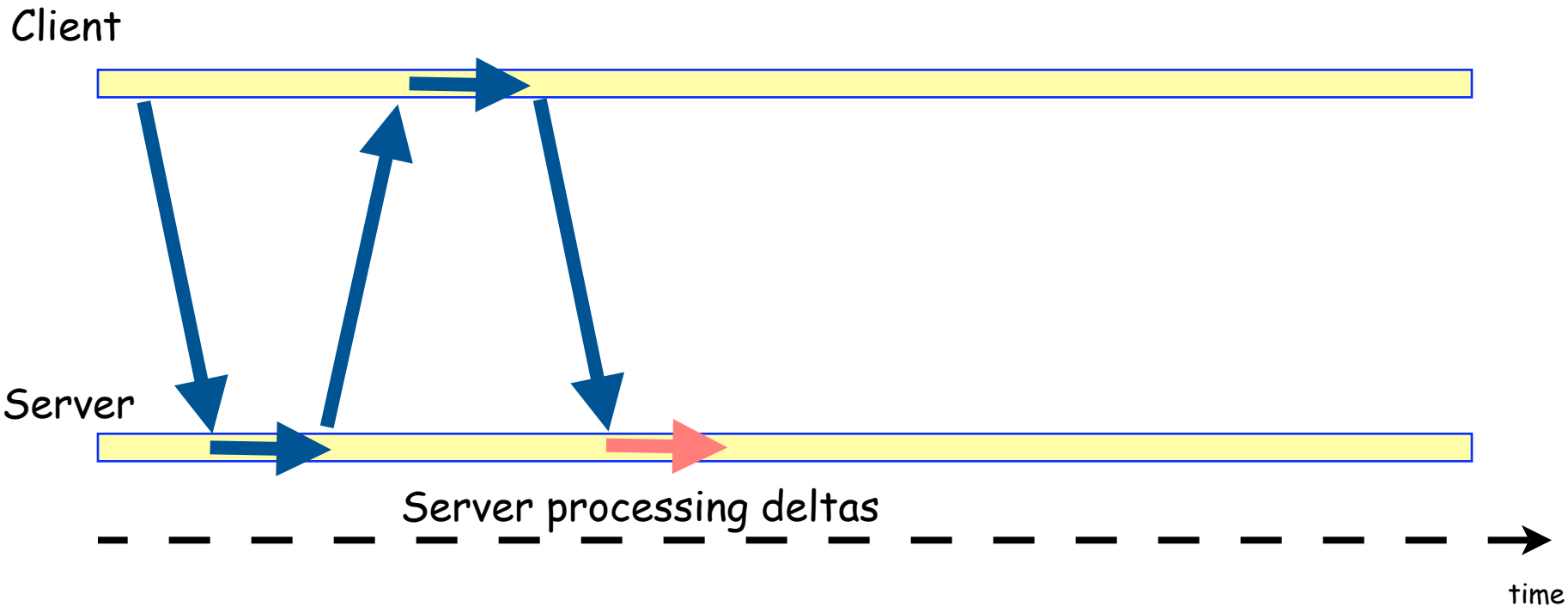
AJAX

a new request for DELTAs is done



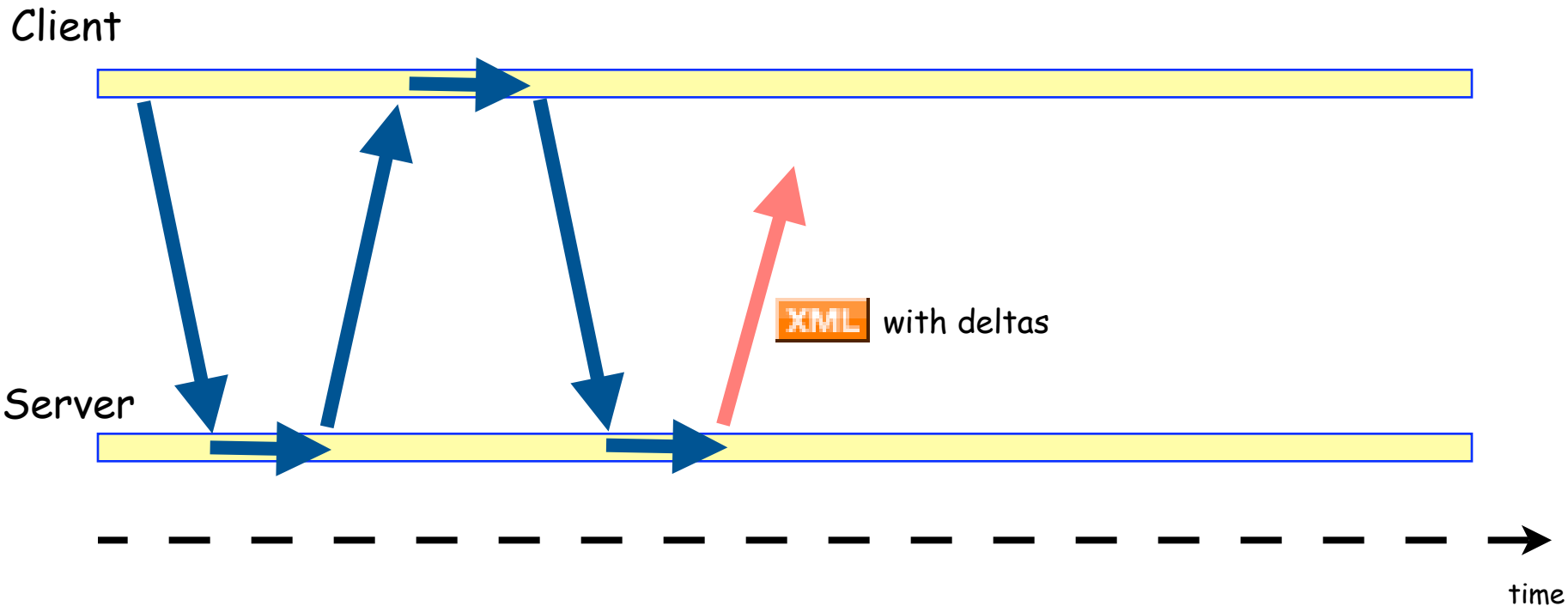
AJAX

the server processes the request and decides what has changed



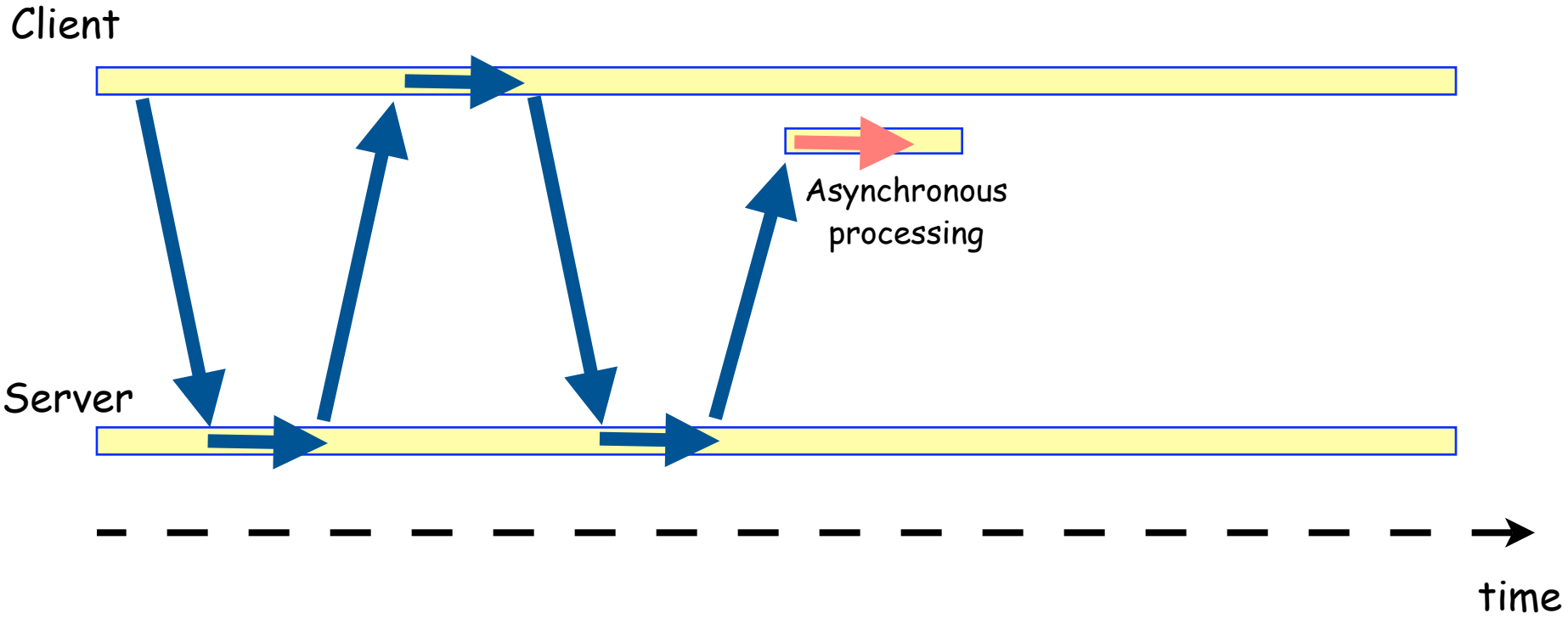
AJAX

response is given formatting delta into XML



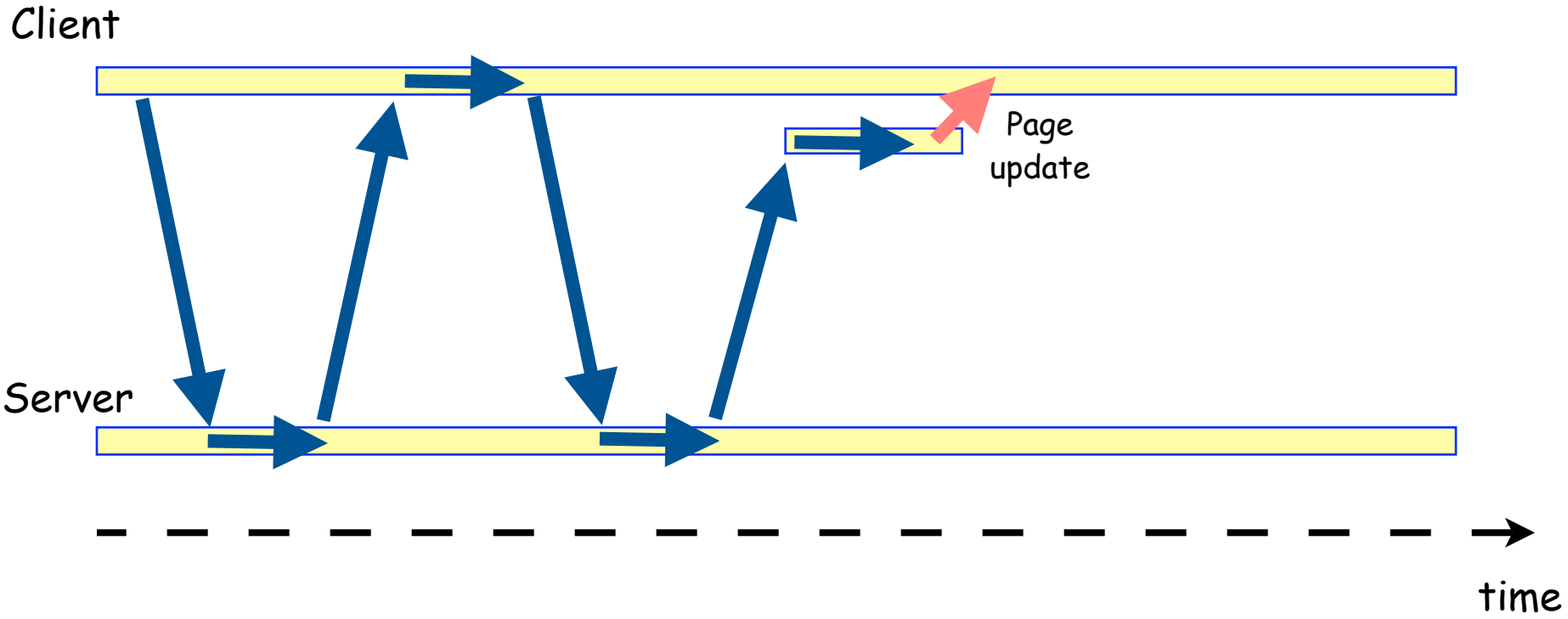
AJAX

the delta is processed asynchronously using javascript



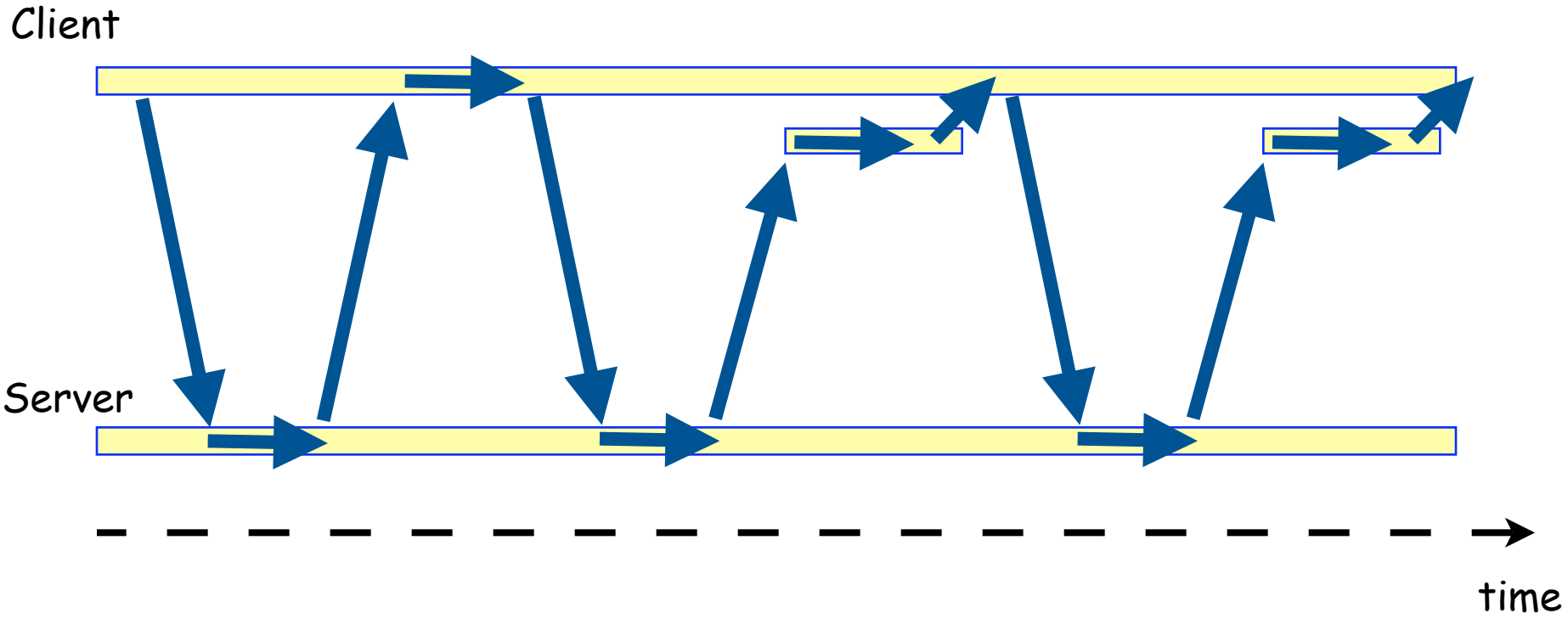
AJAX

and the page is finally updated

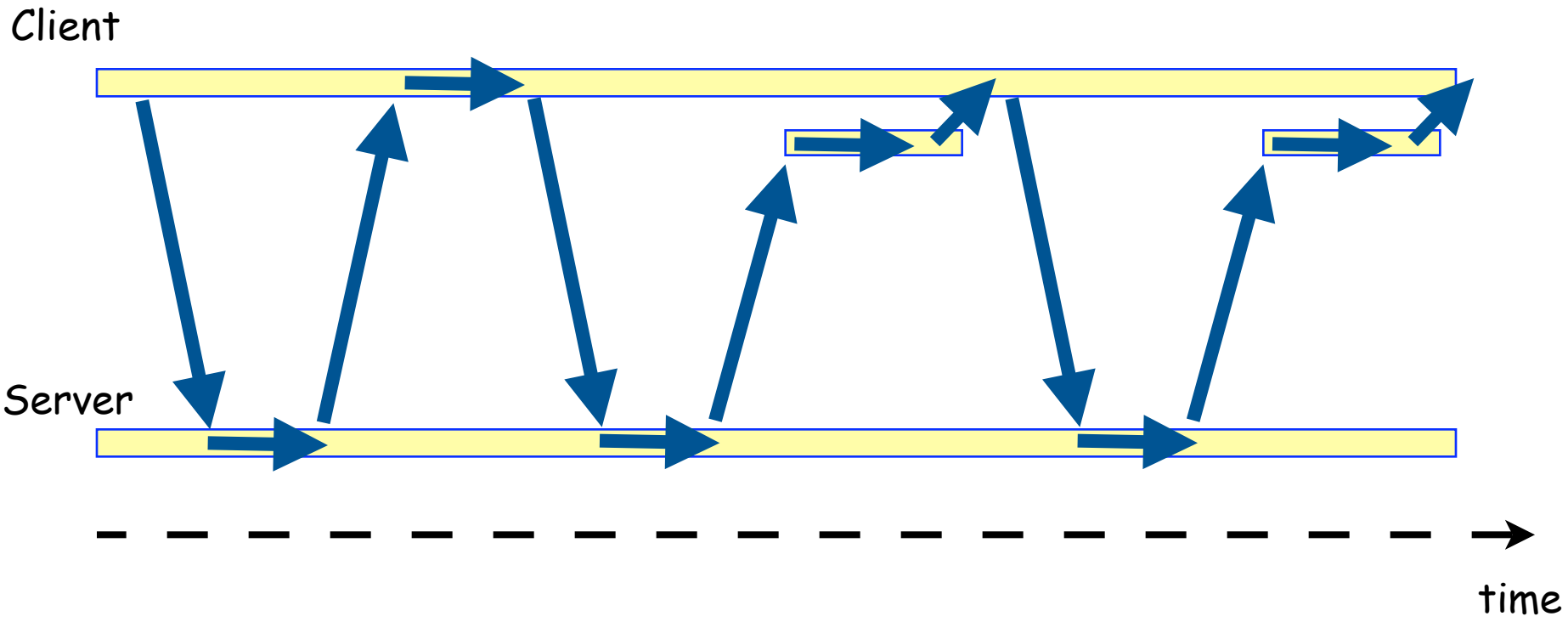


AJAX

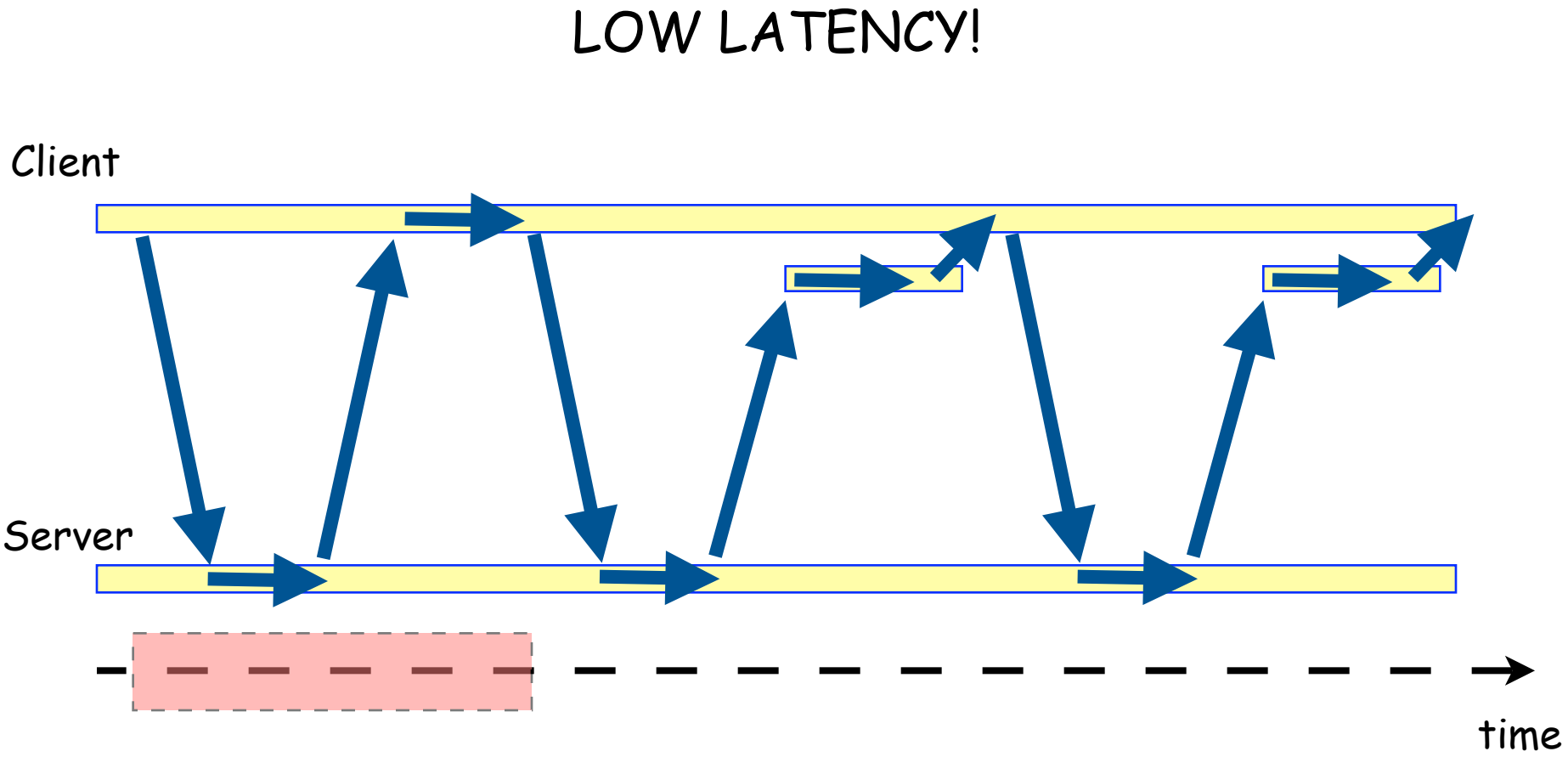
iterate on new user's requests



The AJAX advantage

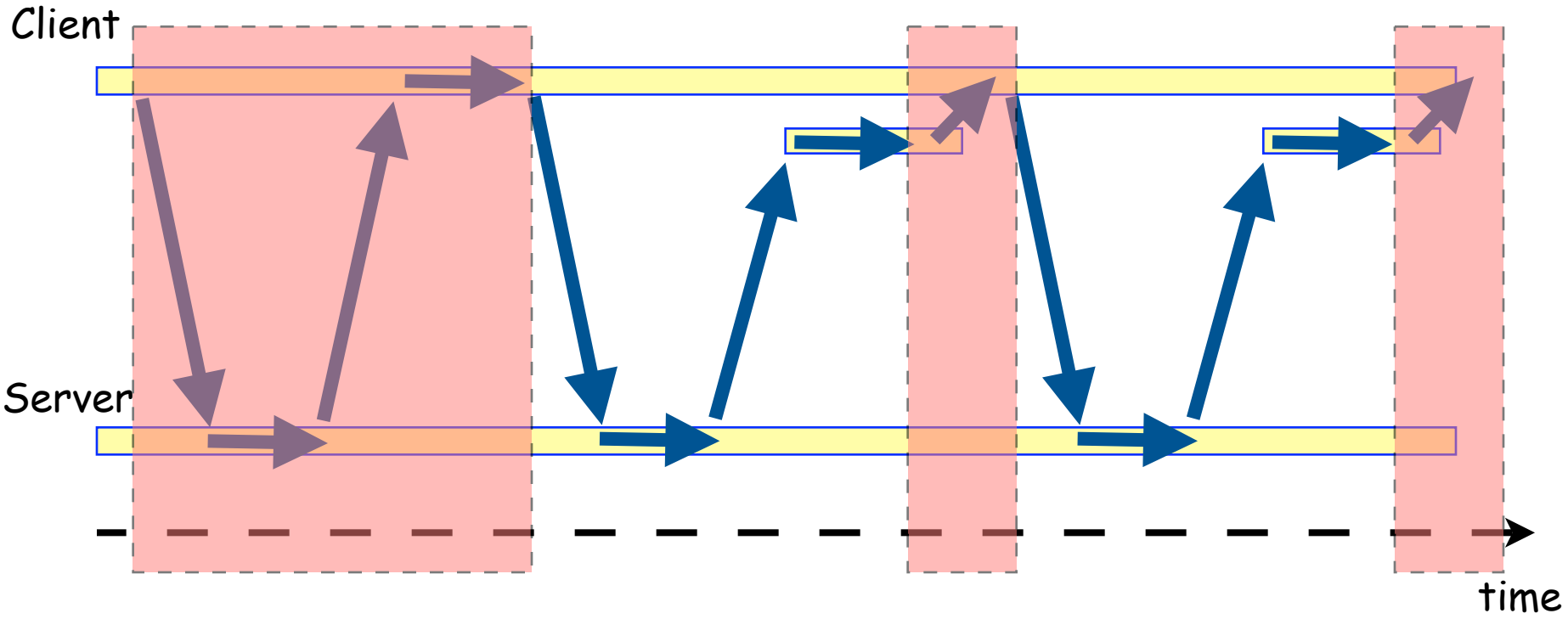


The AJAX advantage



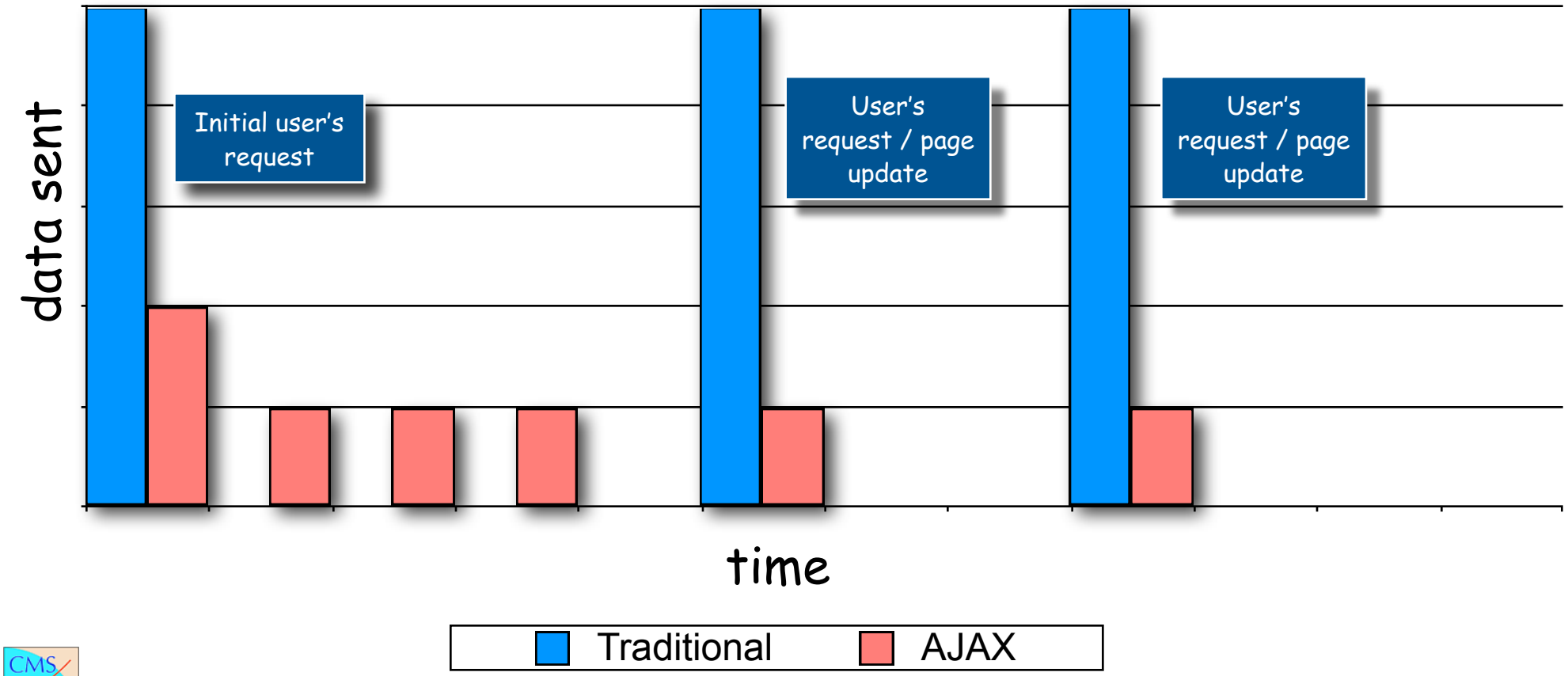
The AJAX advantage

Reduced time the web page is not available



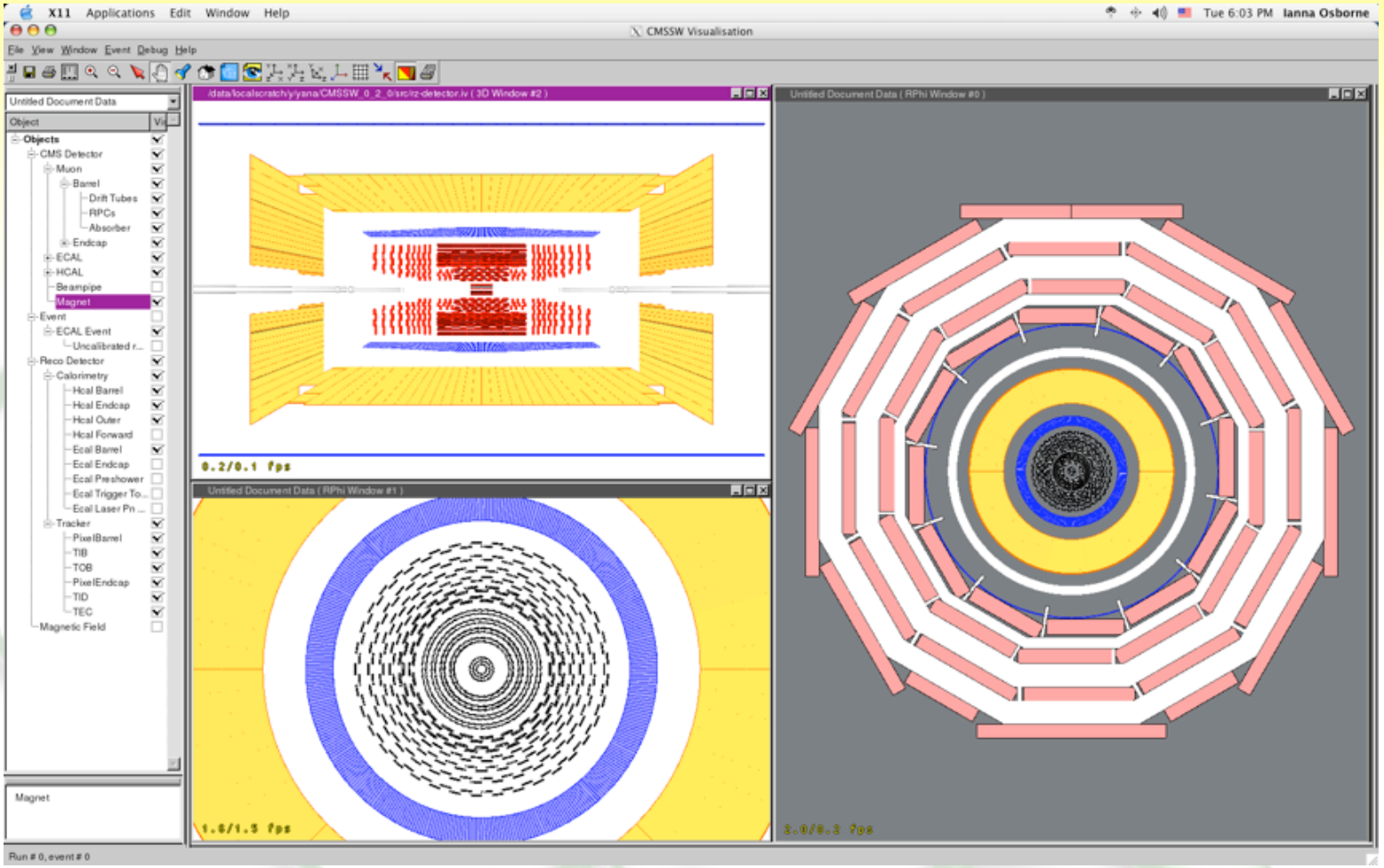
The AJAX advantage

On update only deltas are sent



IGUANA and AJAX

Interactive Graphics for User Analysis

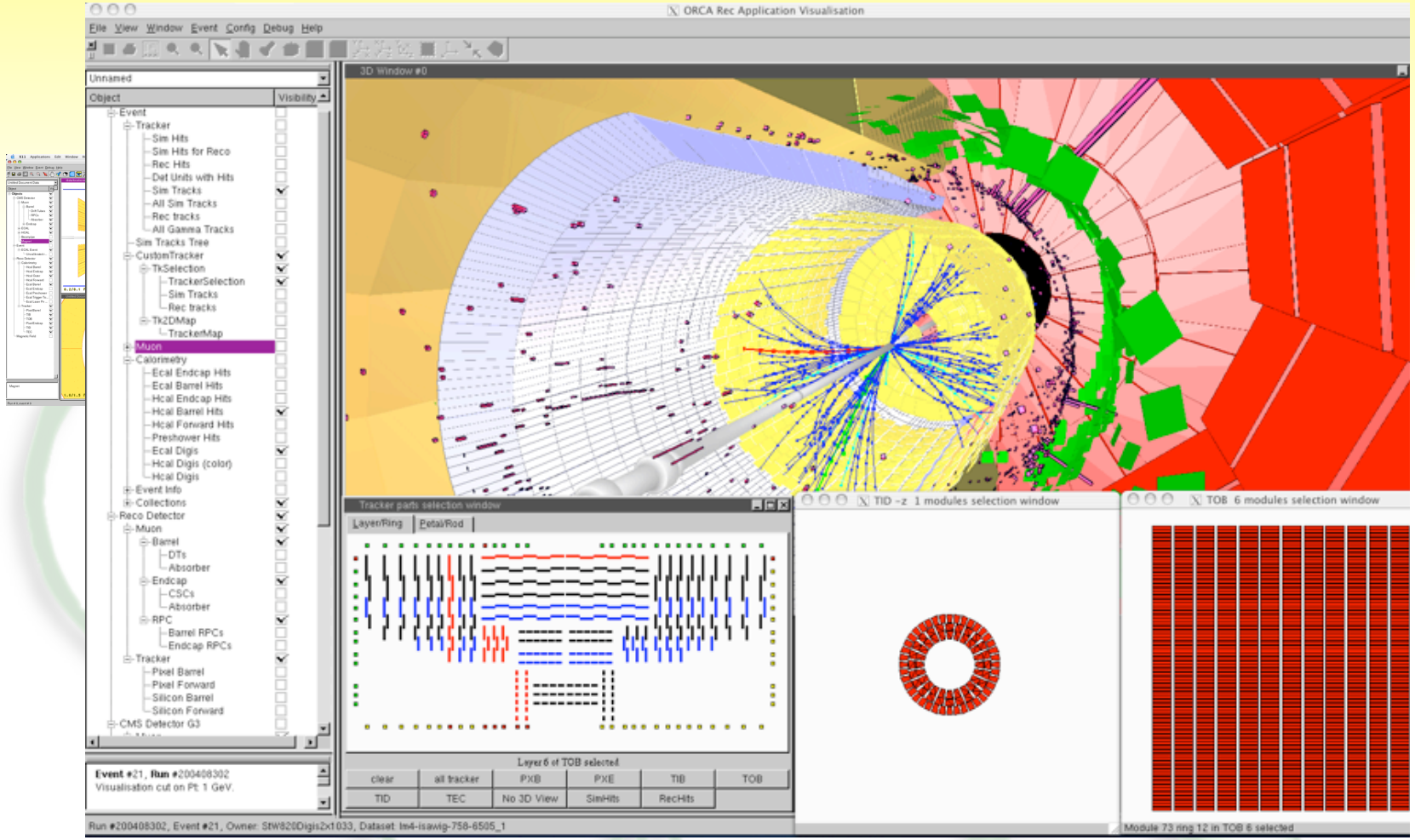


QT | Open Inventor | ROOT

IGUANA object model and visualization toolkit

Data sources

Online software | Offline software | Data Quality Monitoring | G4



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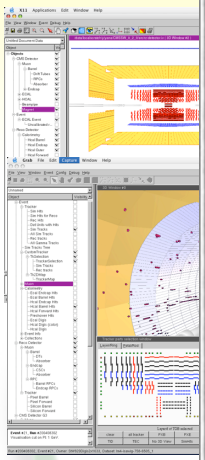

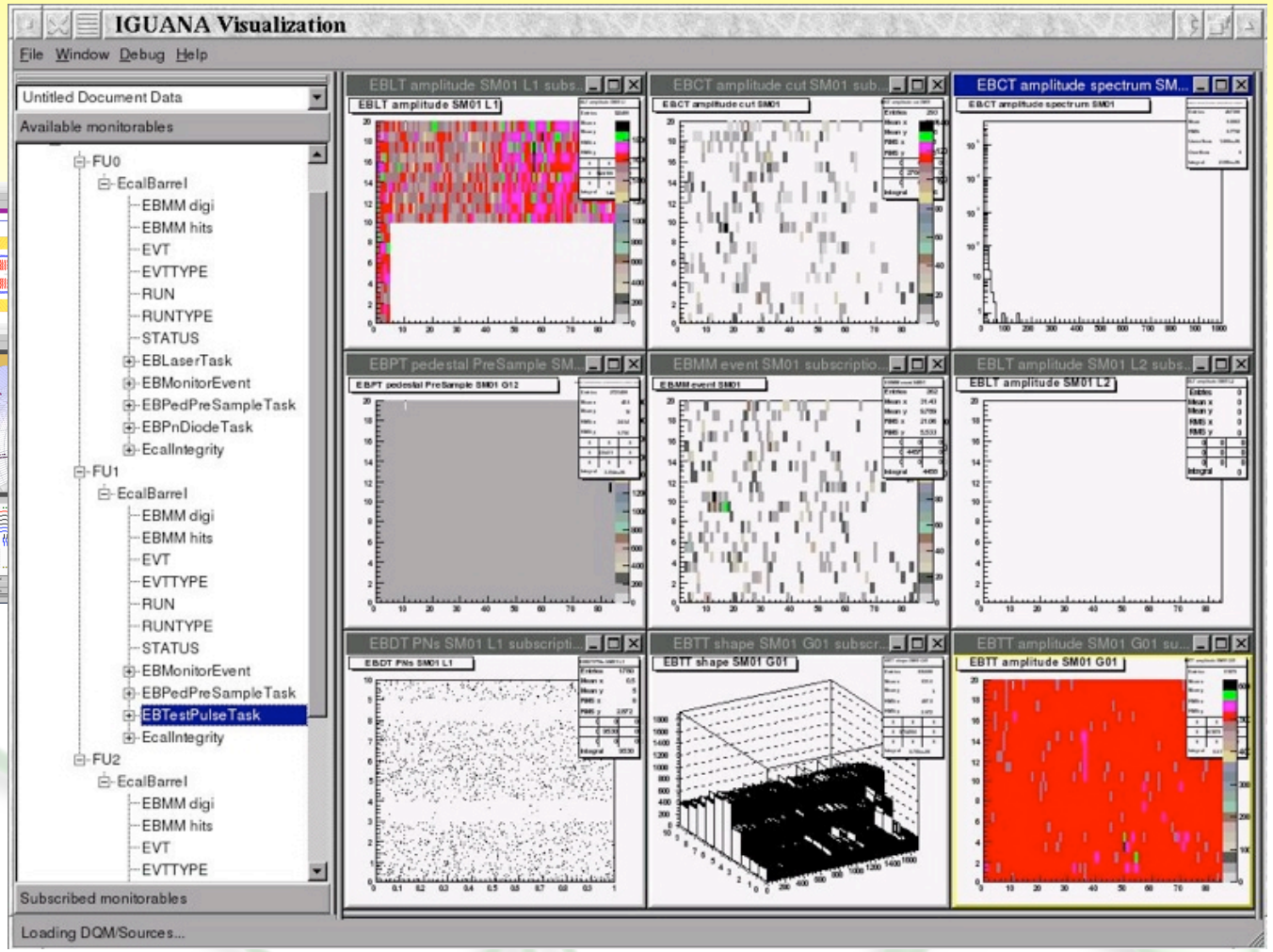

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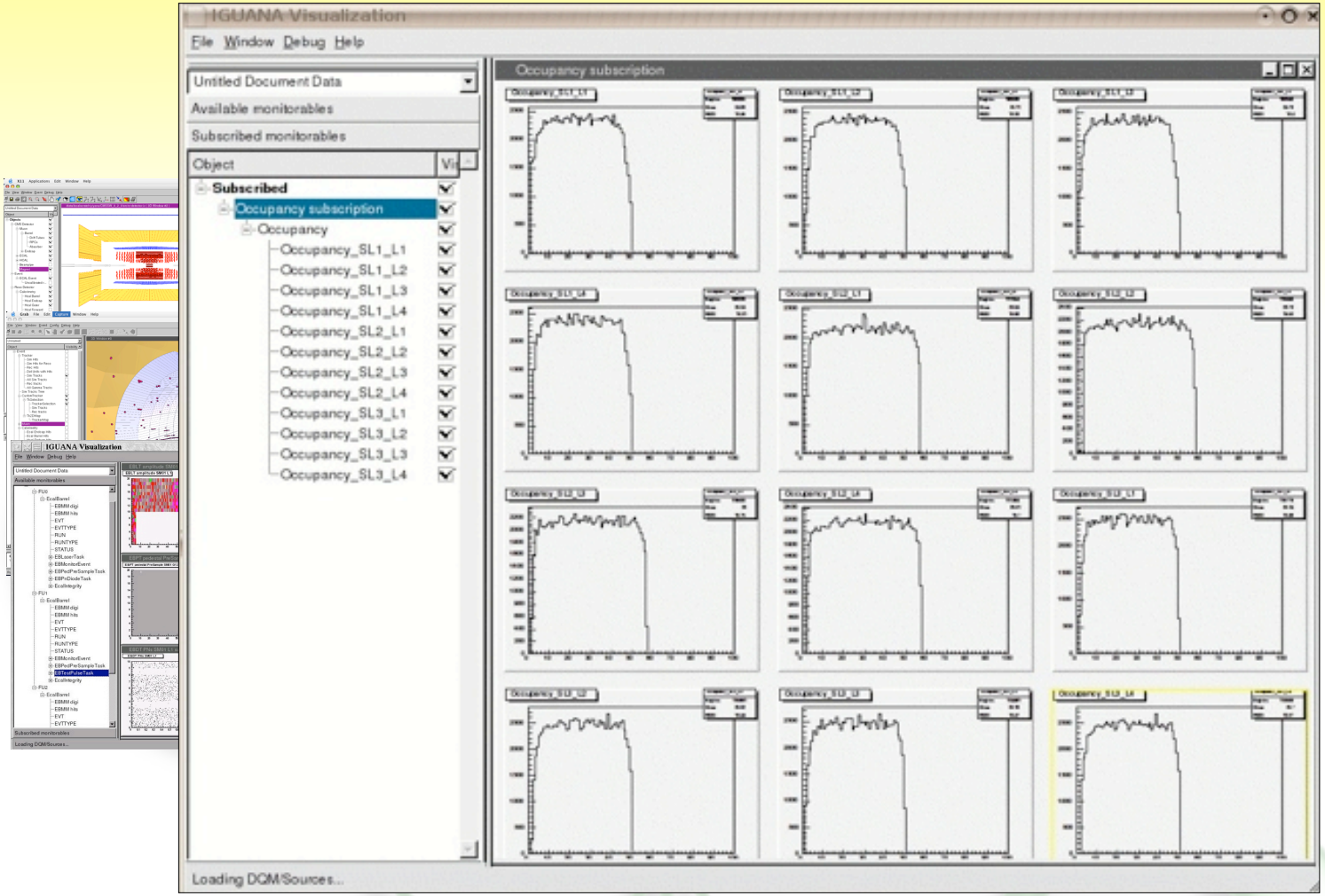

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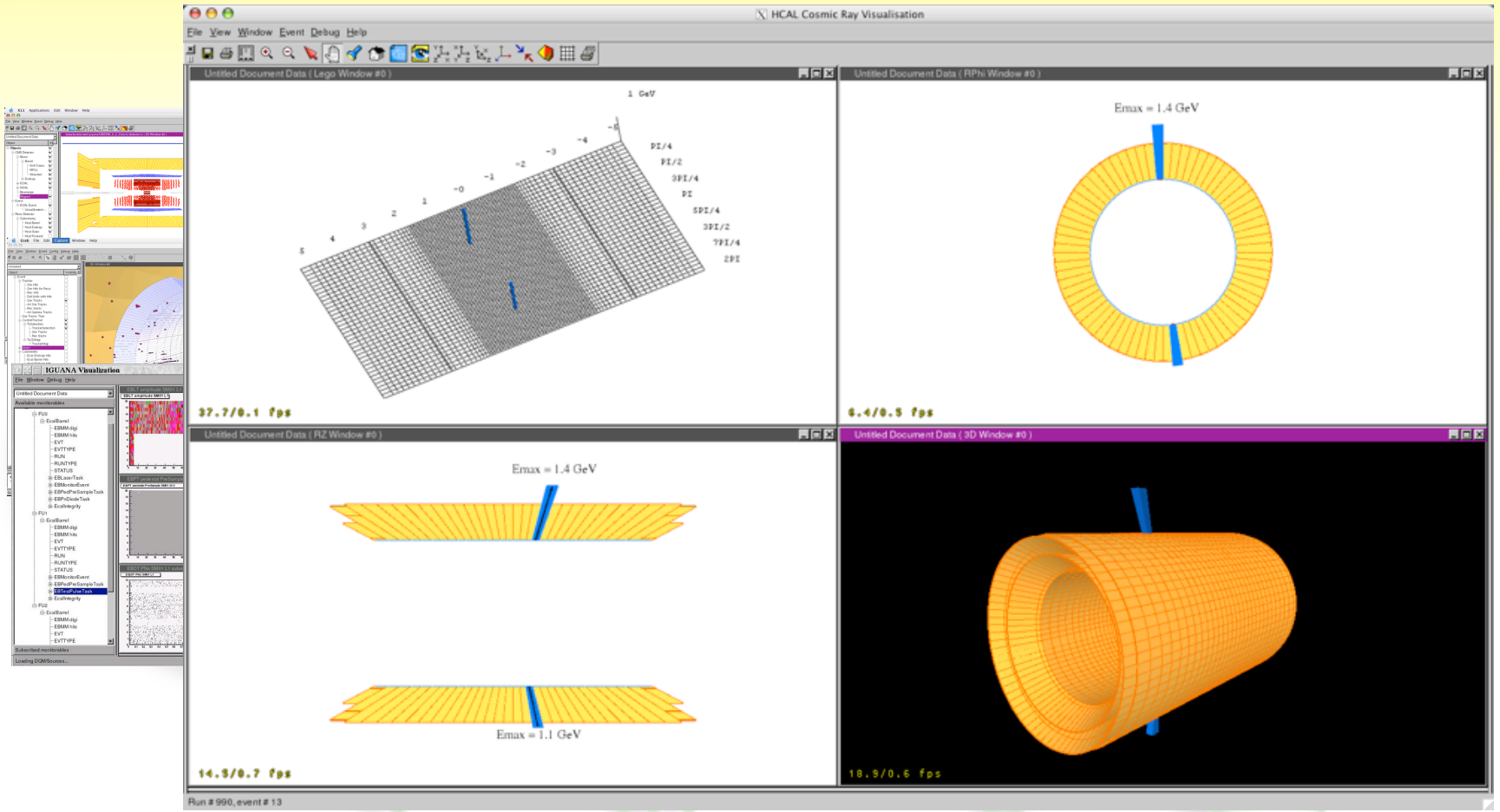

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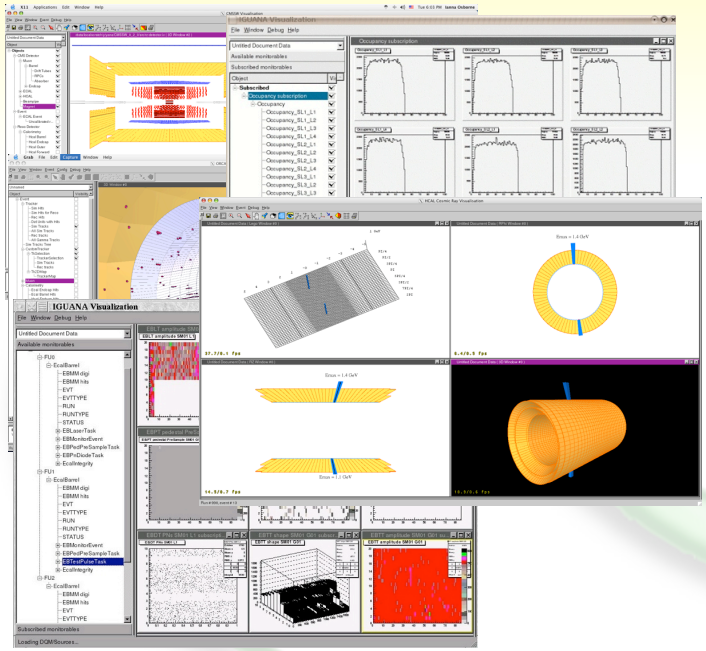

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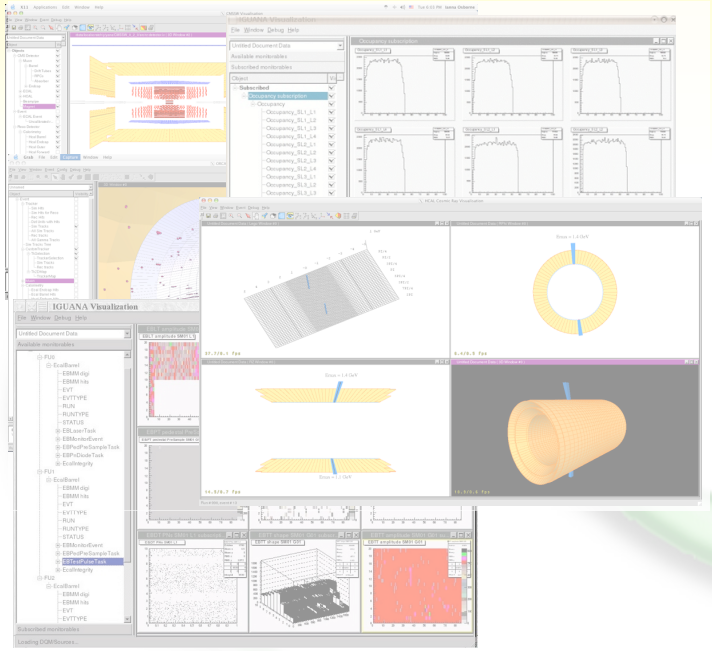

IGUANA Web Services

IGUANA Javascript GUI library

QT

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ROOT

IGUANA embedded HTTP/1.1 server

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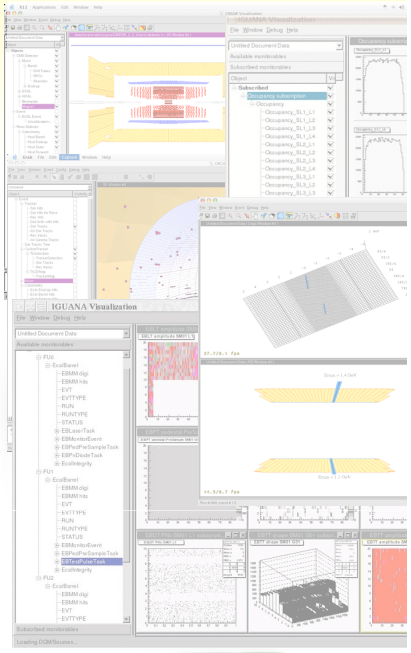

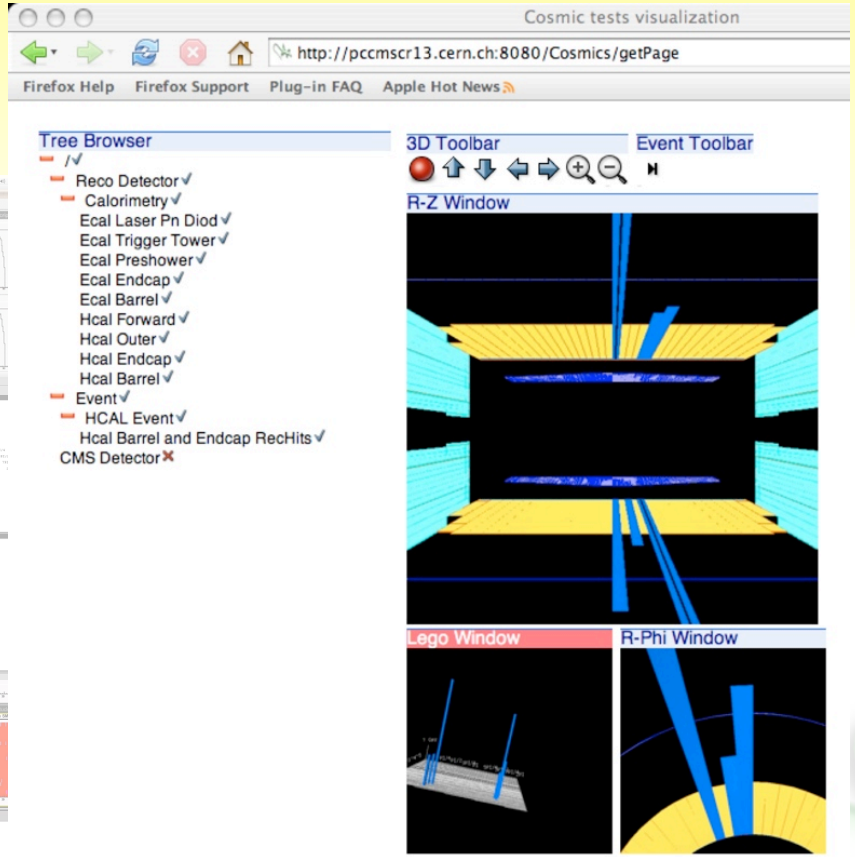

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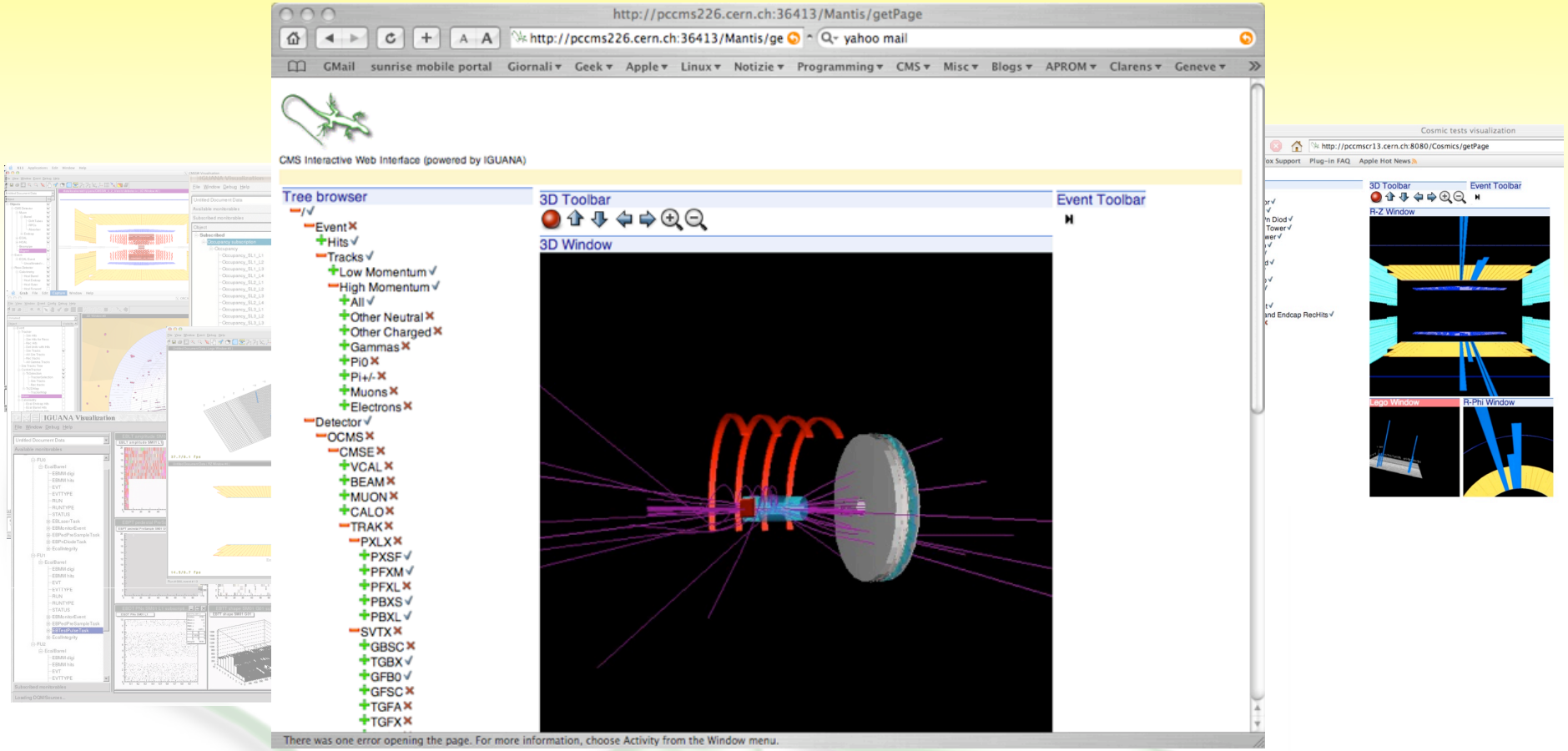

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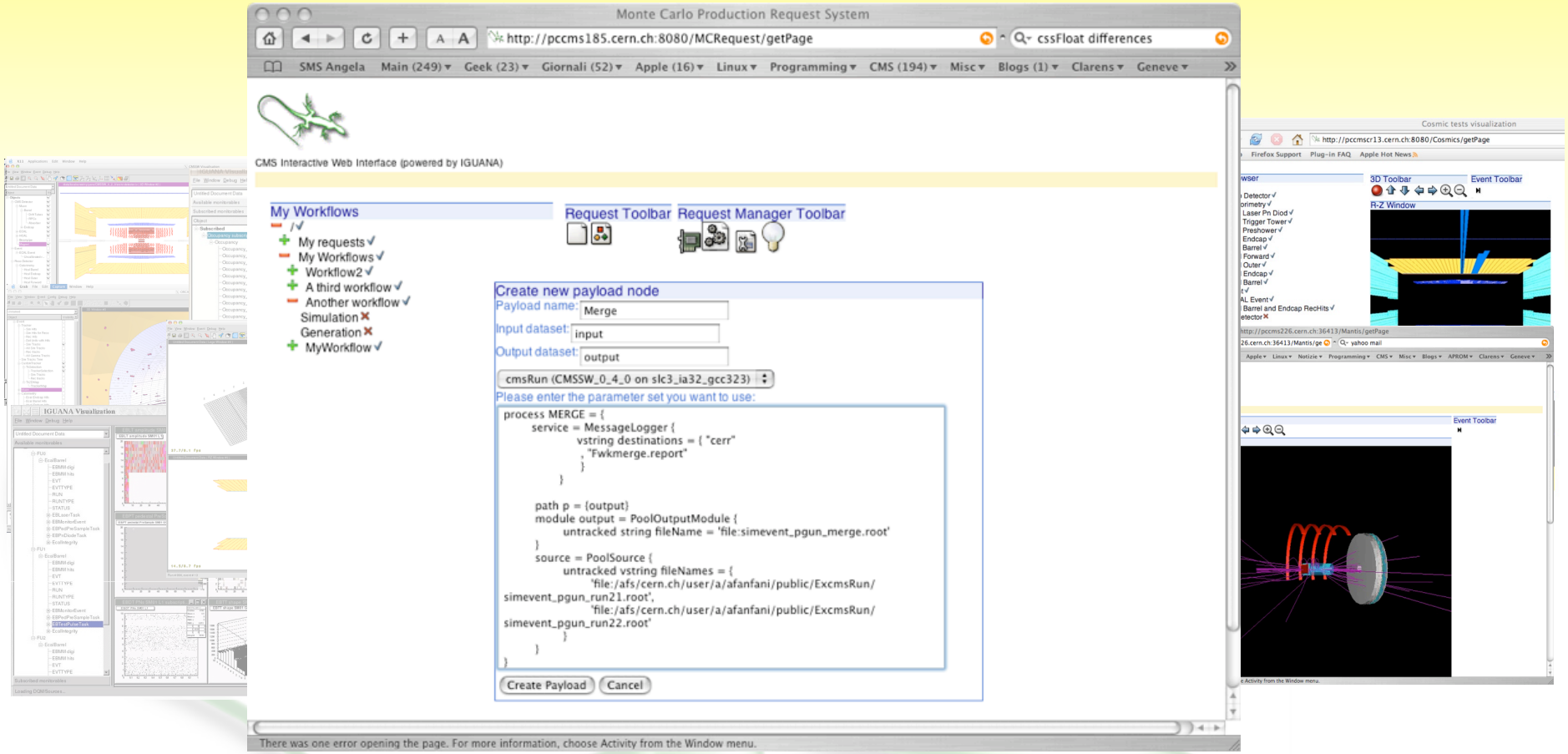

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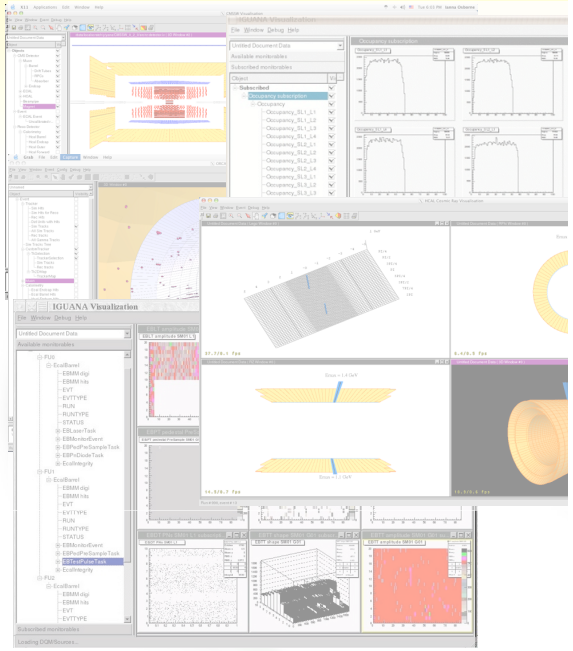

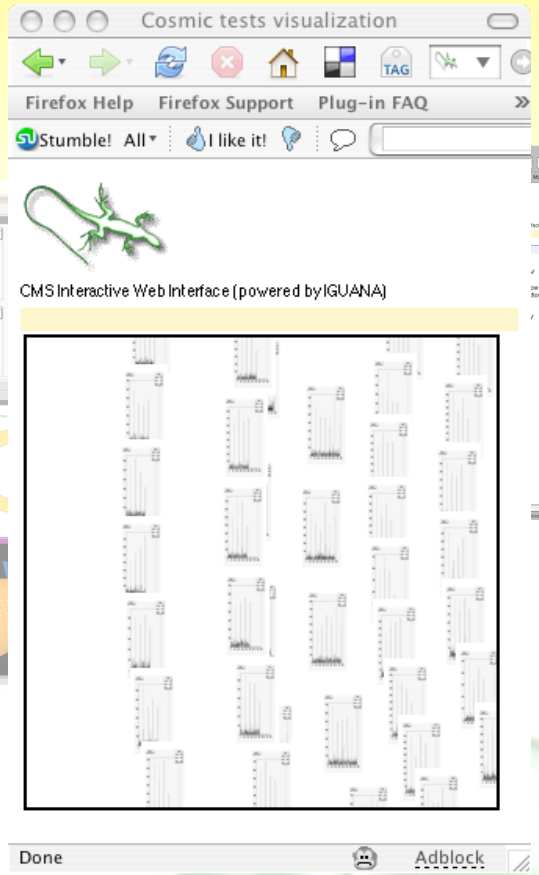

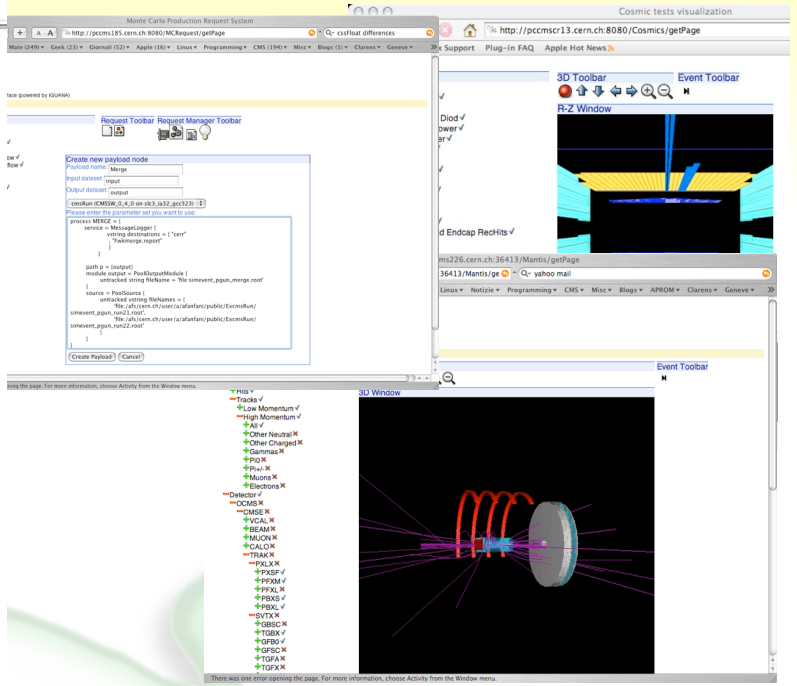

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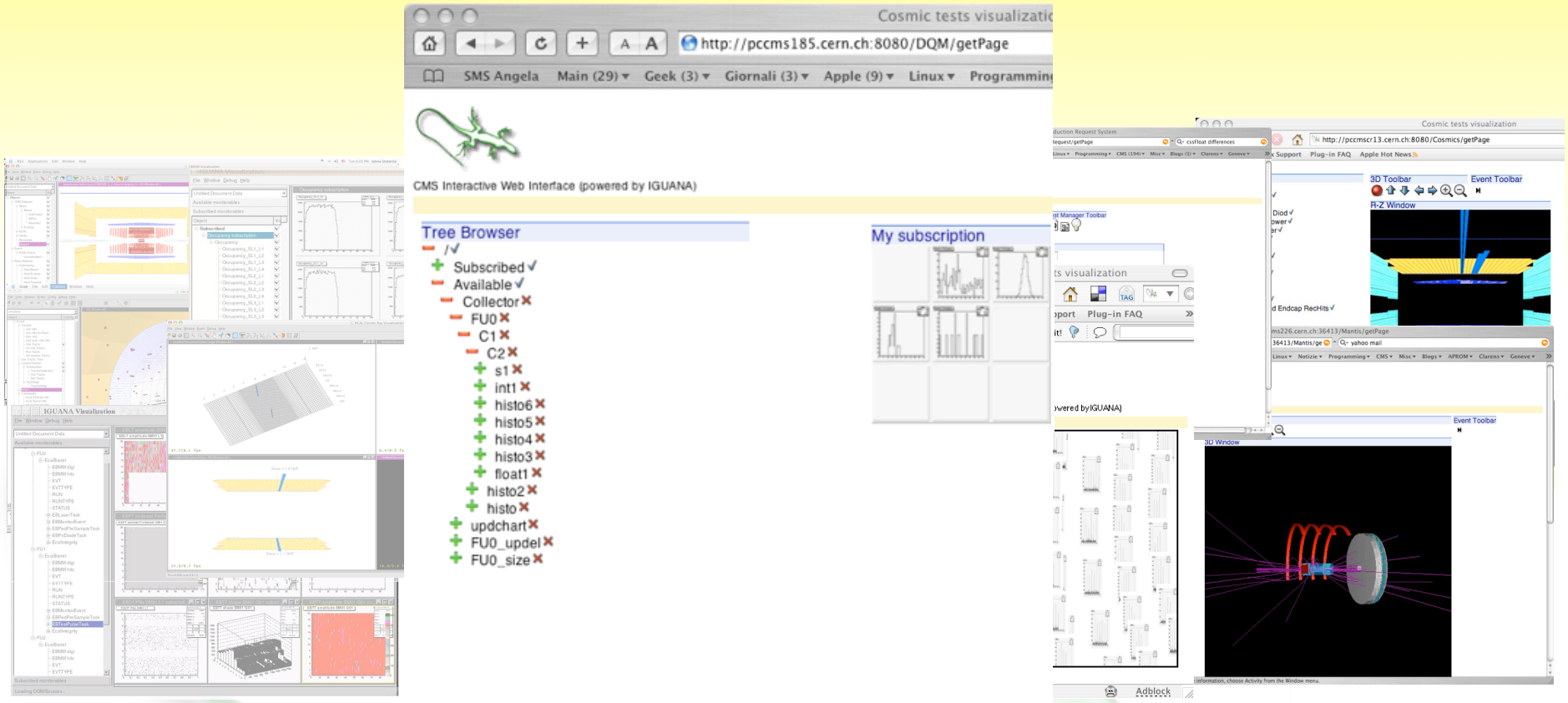

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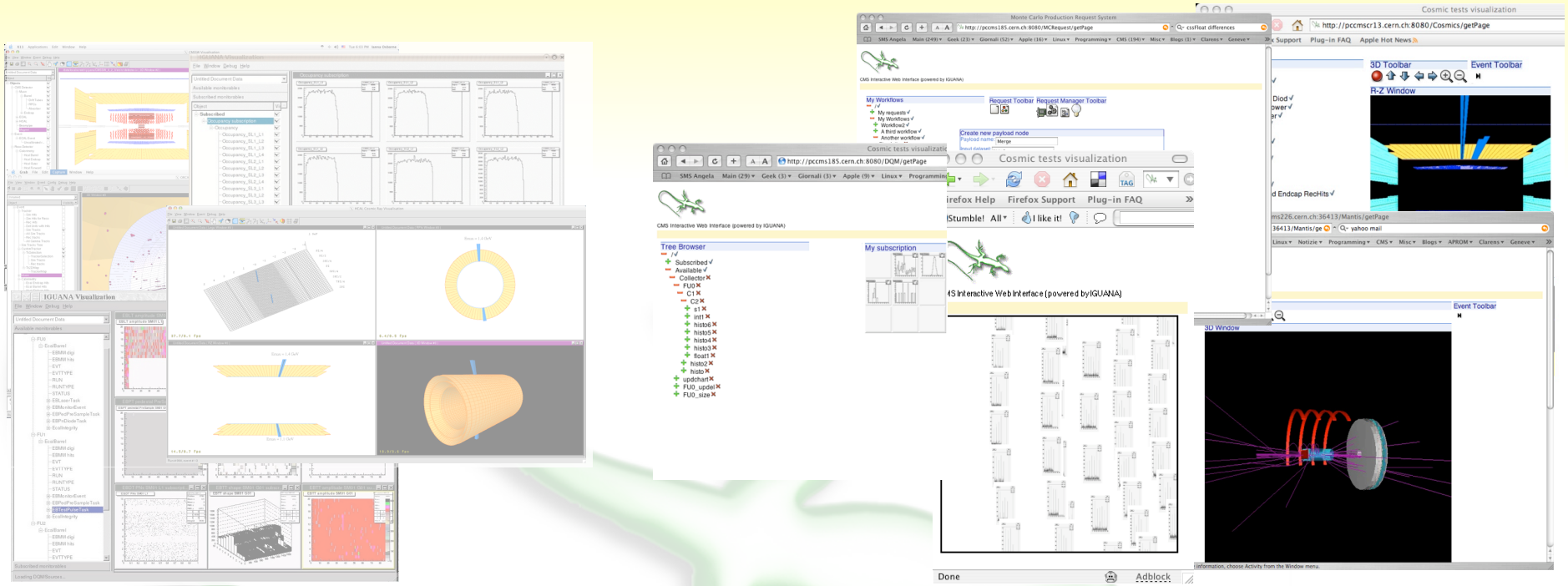

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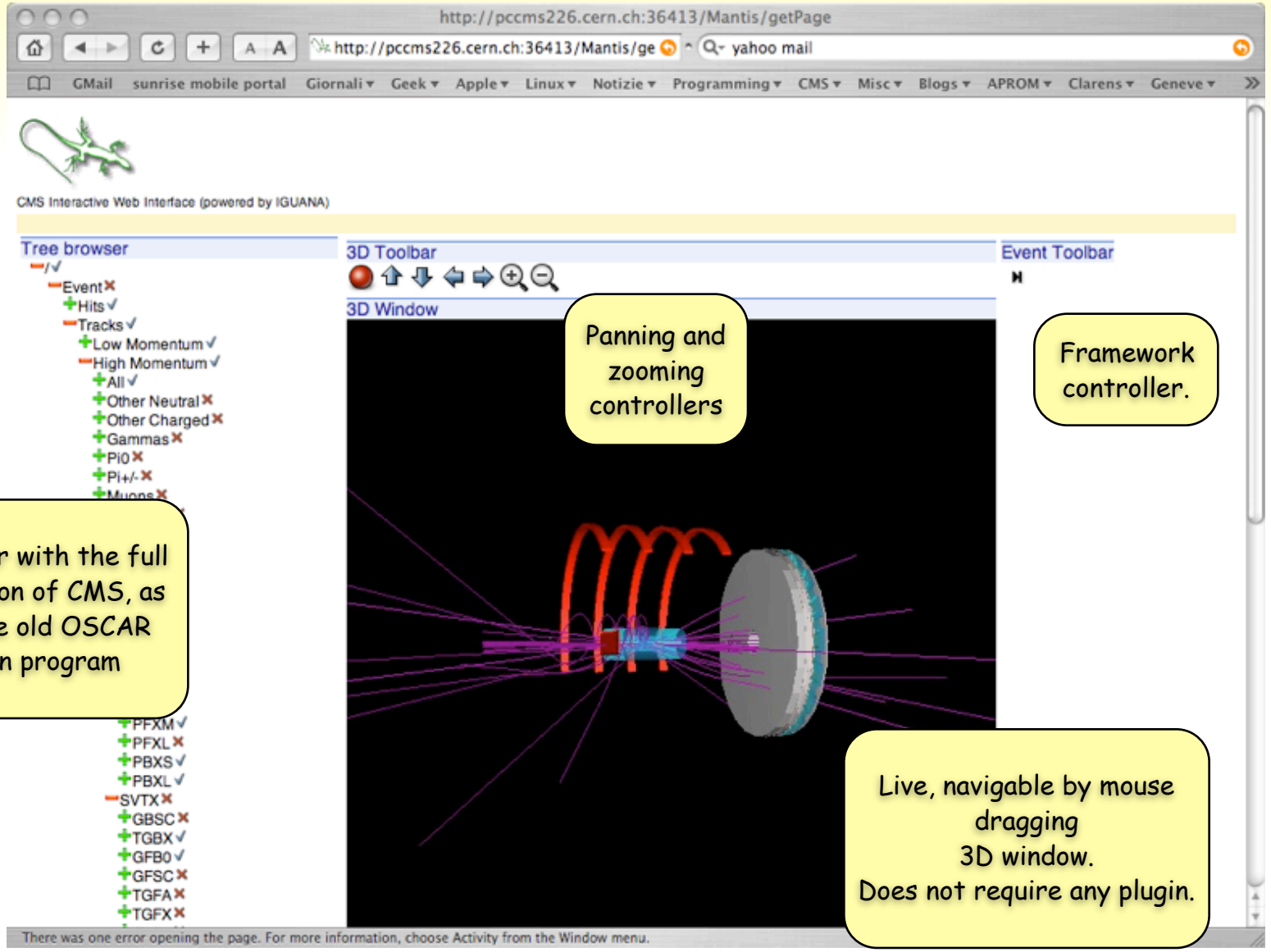
G4 Visualization



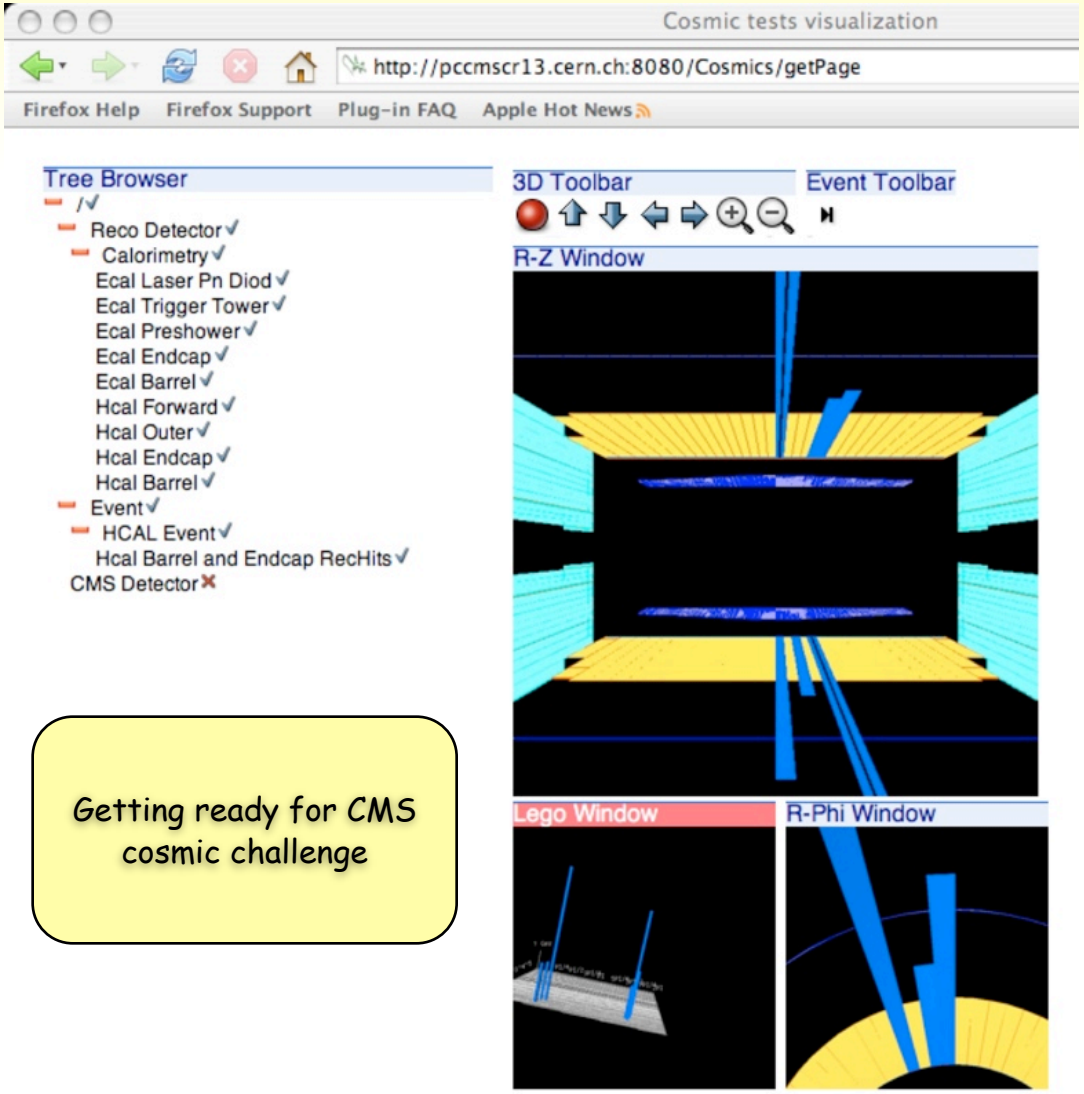
Tree browser with the full G4 description of CMS, as found in the old OSCAR simulation program

Panning and zooming controllers

Framework controller.

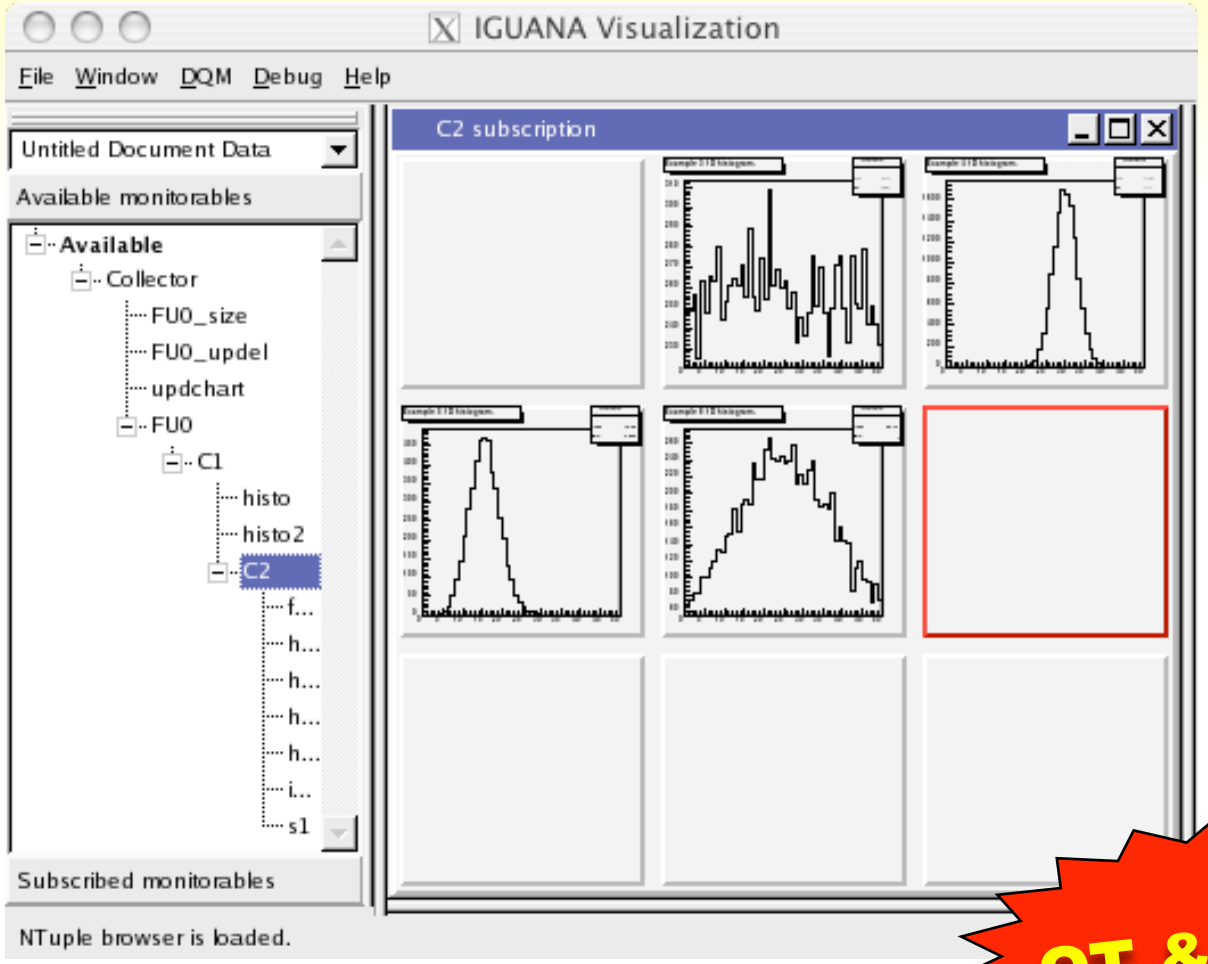
Live, navigable by mouse dragging
3D window.
Does not require any plugin.

CMS offline software



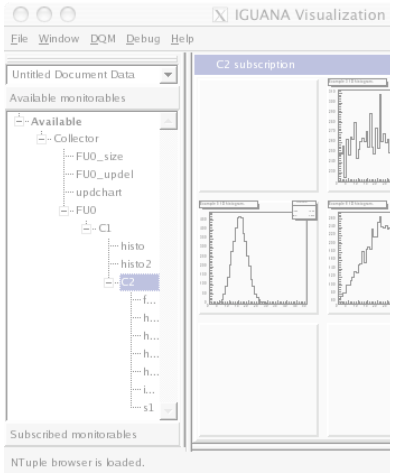
Getting ready for CMS cosmic challenge

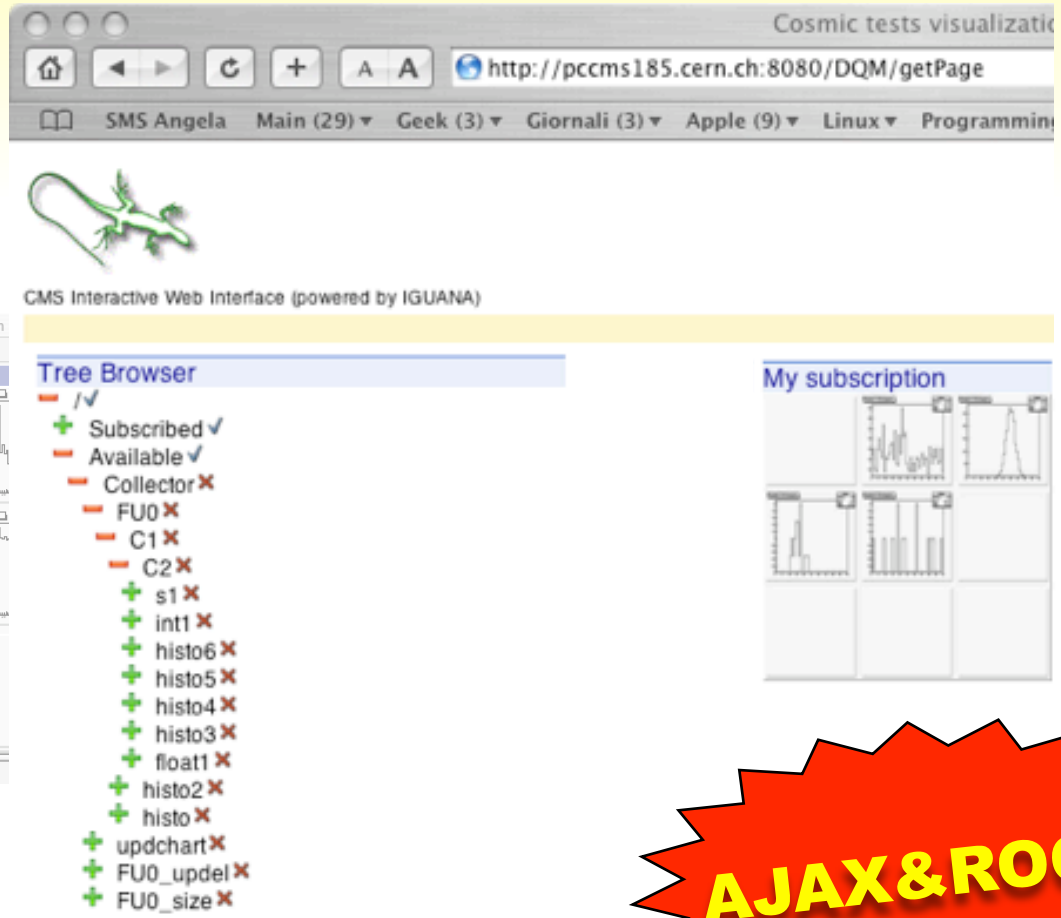
Generic DQM GUI



QT & ROOT

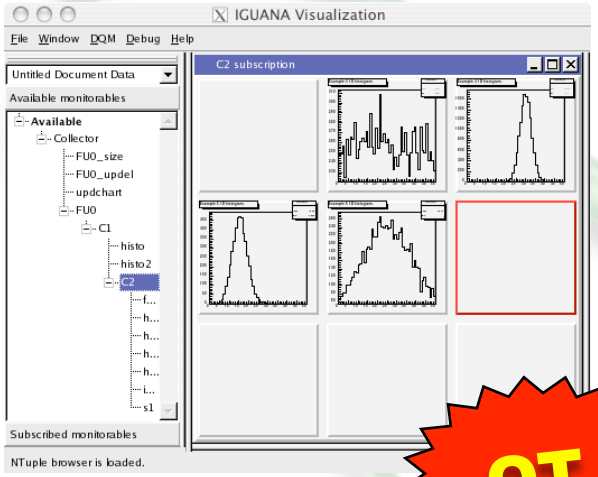
Generic DQM GUI





Generic DQM GUI

The two implementations share most of the code!!!

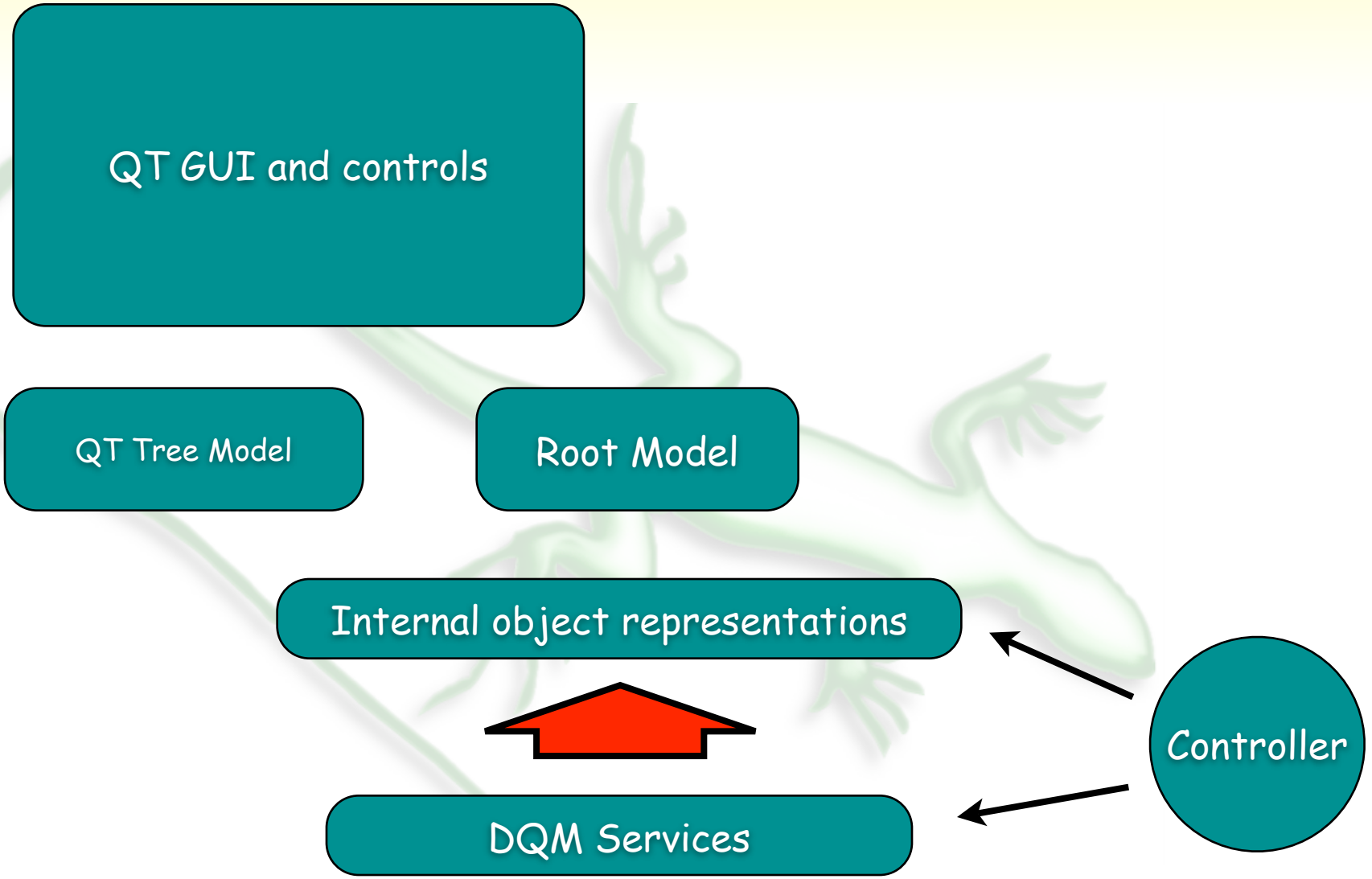


QT

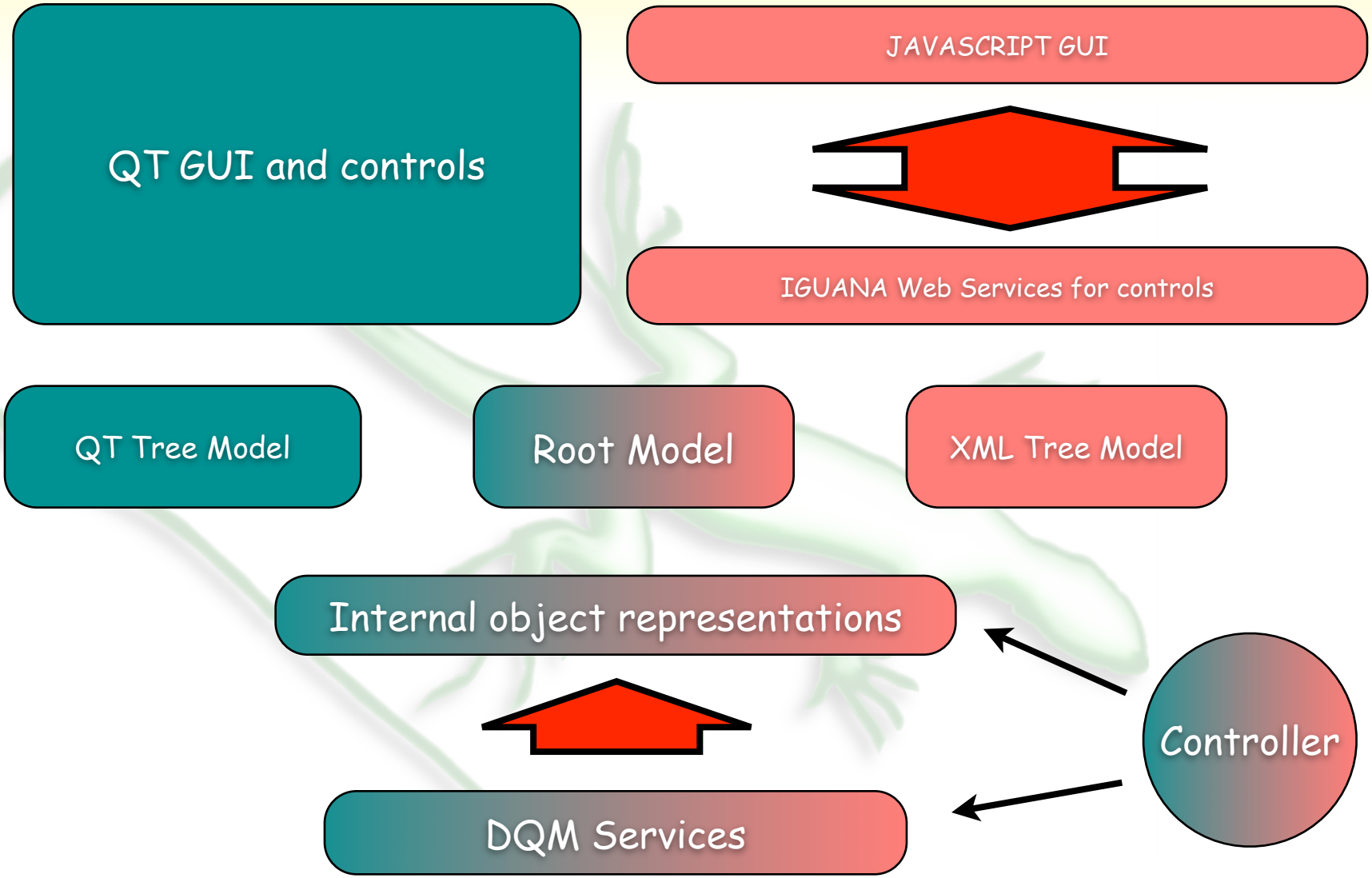
AJAX

AJAX allows to have the same behaviour of desktop and web applications.

Generic DQM GUI



Generic DQM GUI



MC Request system

CMS Interactive Web Interface (powered by IGUANA)

My Workflows

- /
  - My requests
  - My Workflows
    - Workflow2
    - A third workflow
    - Another workflow
      - Simulation
      - Generation
    - MyWorkflow

Request Toolbar

Request Manager Toolbar

Javascript generated GUI with connection to backend DBs via CORAL

Create new payload node

Payload name: Merge

Input dataset: input

Output dataset: output

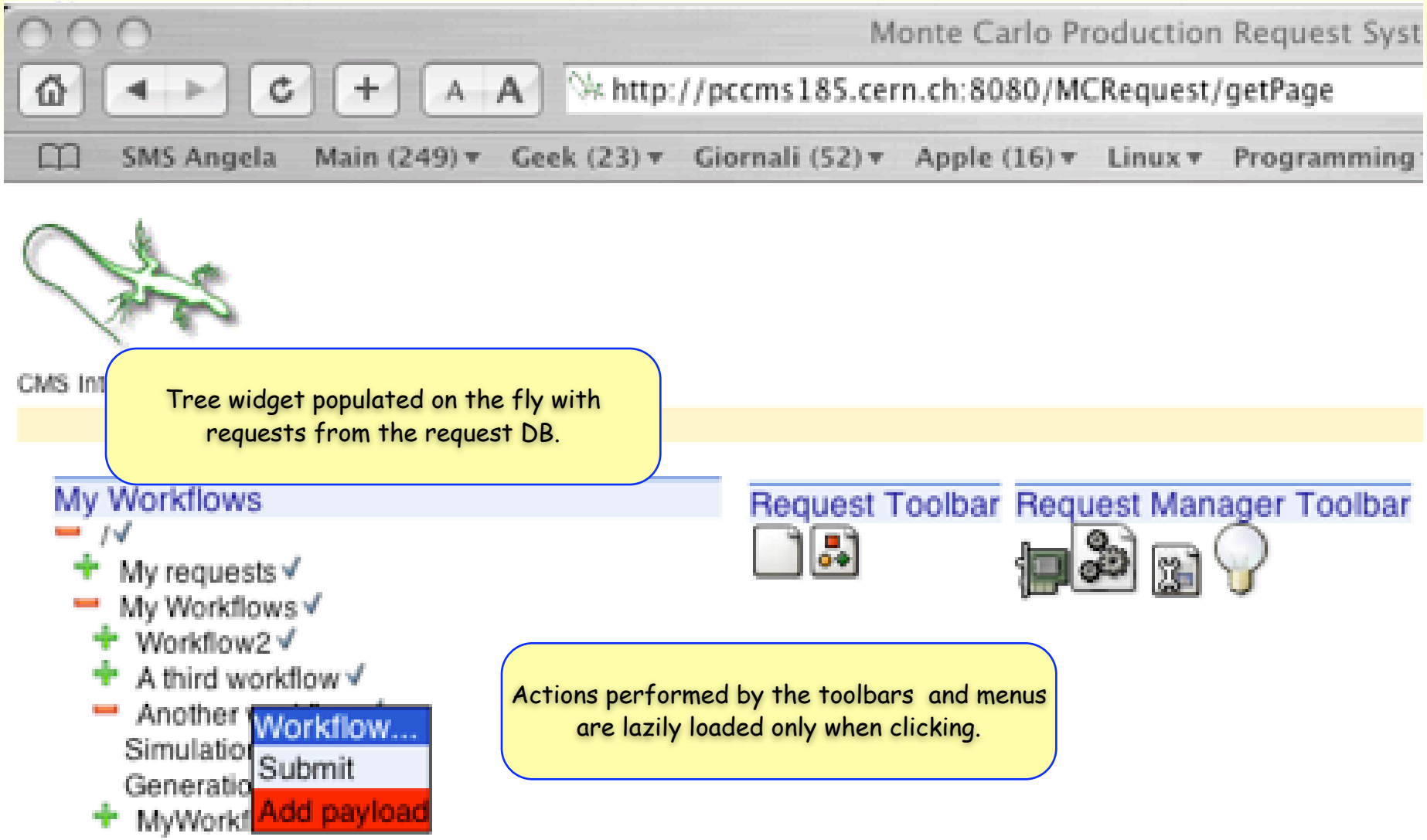
cmsRun (CMSSW_0_4_0 on slc3_ia32_gcc323)

Please enter the parameter set you want to use:

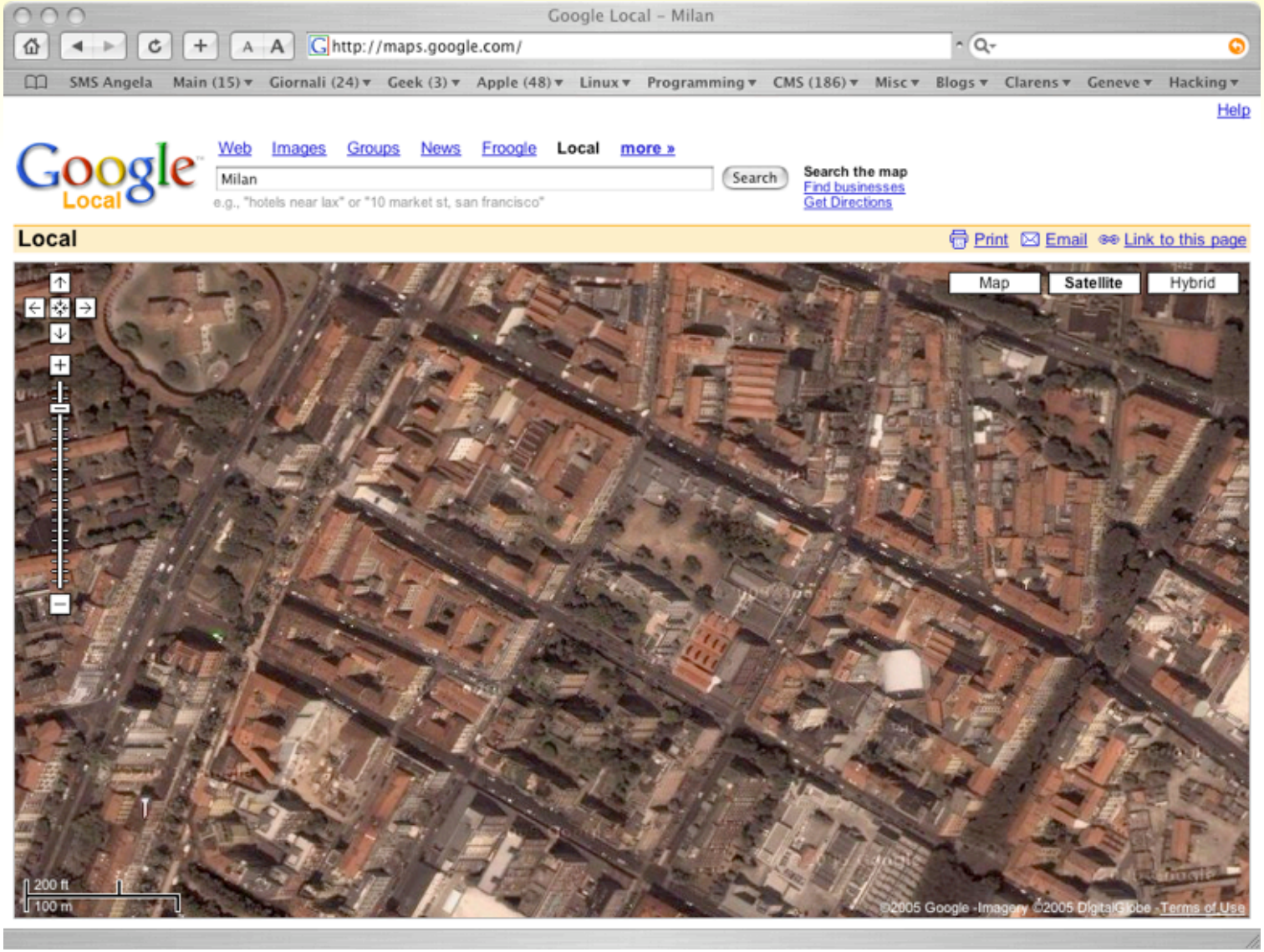
```
process MERGE = {
      service = MessageLogger {
                vstring destinations = { "cerr"
                , "Fwkmerge.report"
                }
            }

      path p = {output}
      module output = PoolOutputModule {
            untracked string fileName = 'file:simevent_pgun_merge.root'
      }
      source = PoolSource {
            untracked vstring fileNames = {
                  'file:/afs/cern.ch/user/a/afanfani/public/ExcmsRun/
simevent_pgun_run21.root',
                  'file:/afs/cern.ch/user/a/afanfani/public/ExcmsRun/
simevent_pgun_run22.root'
                }
      }
}
```

Create Payload | Cancel

MC Request system



Google Map


Google Local – Milan
http://maps.google.com/
SMS Angela
Main (15)
Giornali (24)
Geek (3)
Apple (48)
Linux
Programming
CMS (186)
Misc
Blogs
Clarens
Geneve
Hacking
Help
Google Local
Web
Images
Groups
News
Froogle
Local
more »
Milan
Search
e.g., "hotels near lax" or "10 market st, san francisco"
Search the map
Find businesses
Get Directions
Local
Print
Email
Link to this page
Map
Satellite
Hybrid
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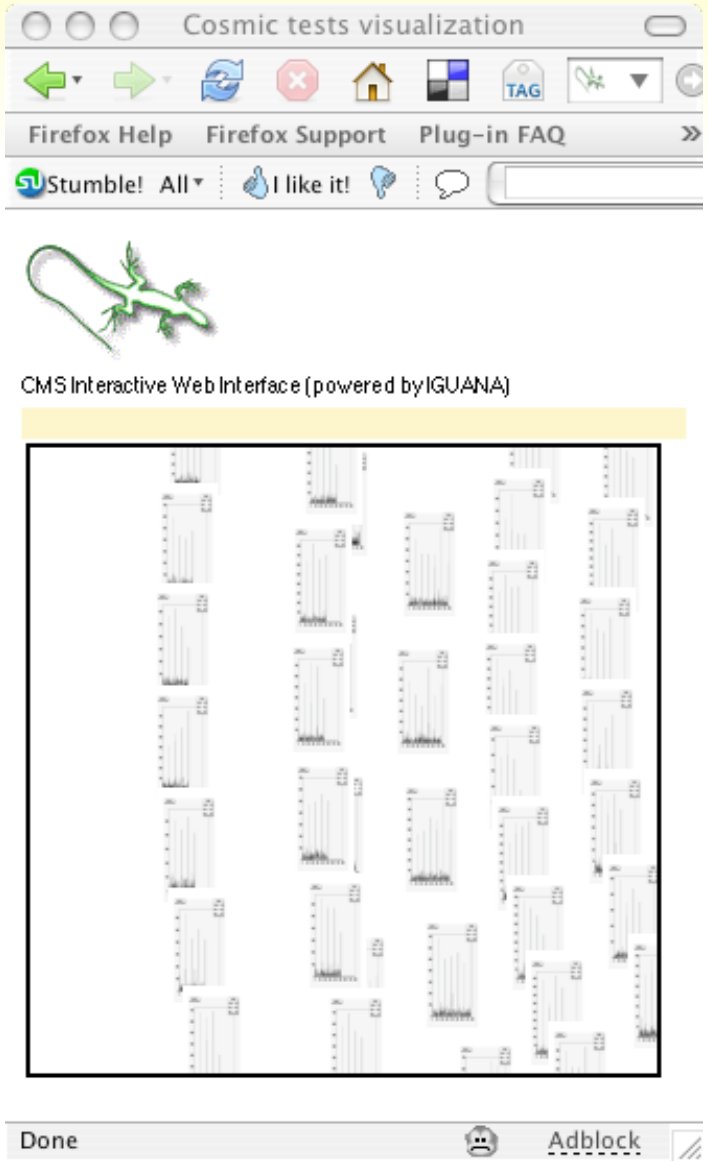
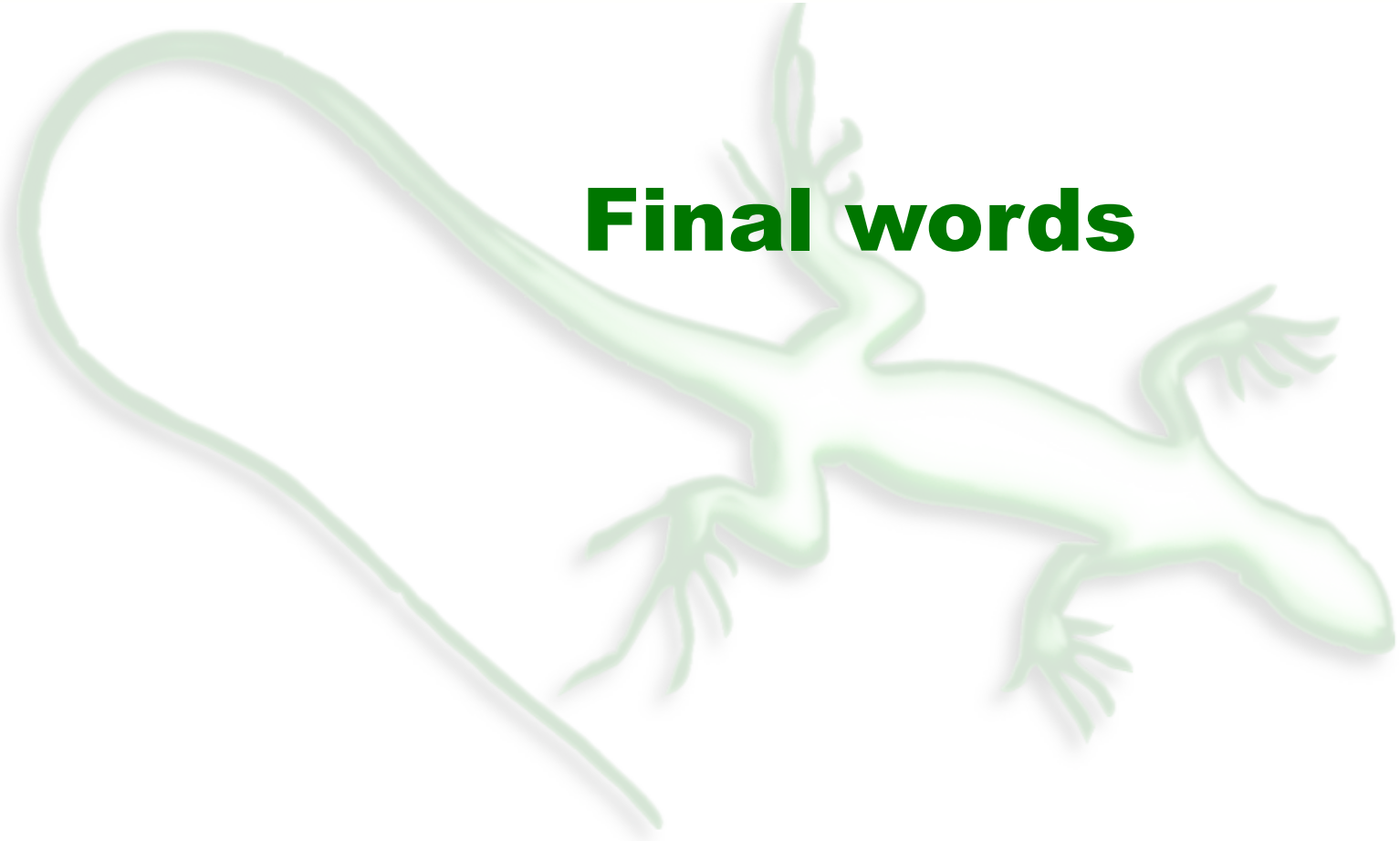
Tracker Map


Cosmic tests visualization
Firefox Help
Firefox Support
Plug-in FAQ
Stumble!
All
I like it!
CMS Interactive Web Interface (powered by IGUANA)
Done
Adblock

Final words



AJAX recap

- AJAX breaks the GET/DISPLAY/RELOAD paradigm used by standard web pages.
- In AJAX web applications data is transferred a little bit at the time in small chunks, when the user requests for it.
- The updates of web pages is asynchronous and happens without touching what the user sees until the end.
- It allows complex, interactive, low latency web applications, without the need for external plugins or JAVA virtual-machine (JAVASCRIPT is not related to JAVA !!!)

IGUANA and AJAX

Iguana provides a framework for creating AJAX applications and has examples for a variety of tasks CMS, ranging from event display to data quality monitoring to MC request system.

Who else uses AJAX

- There are a few "startups" ;) that are using AJAX techniques more and more as well...

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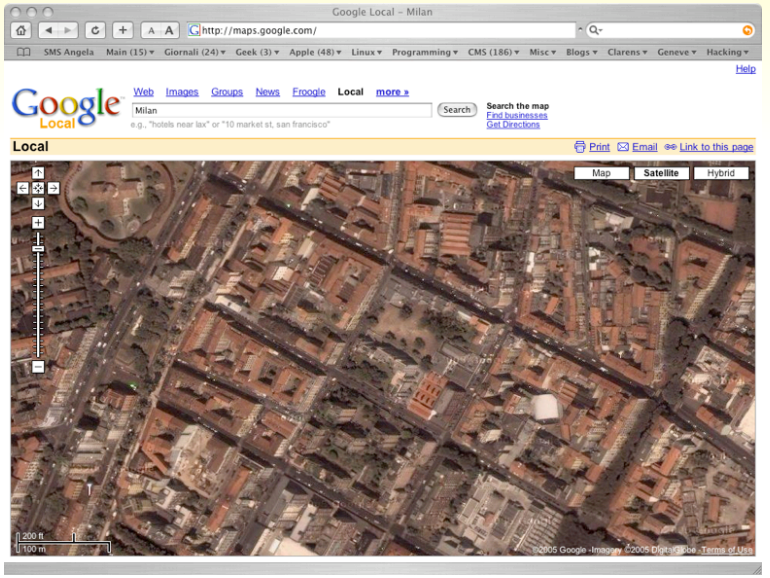

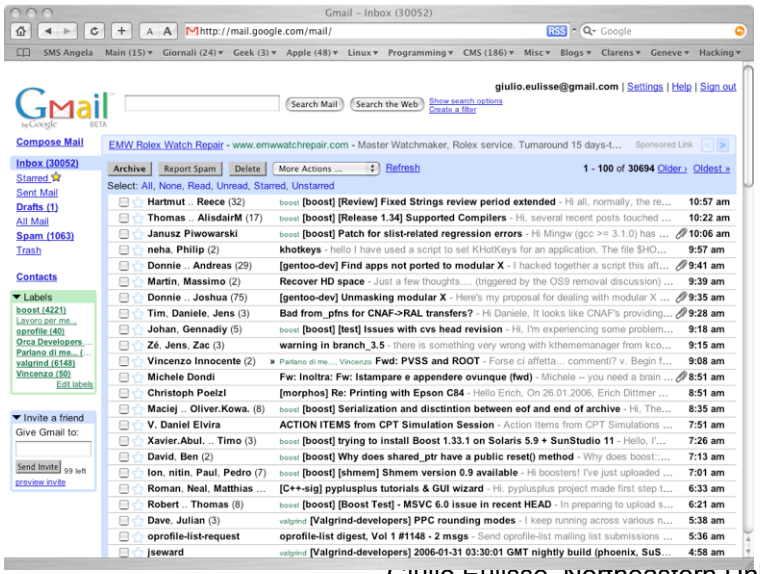

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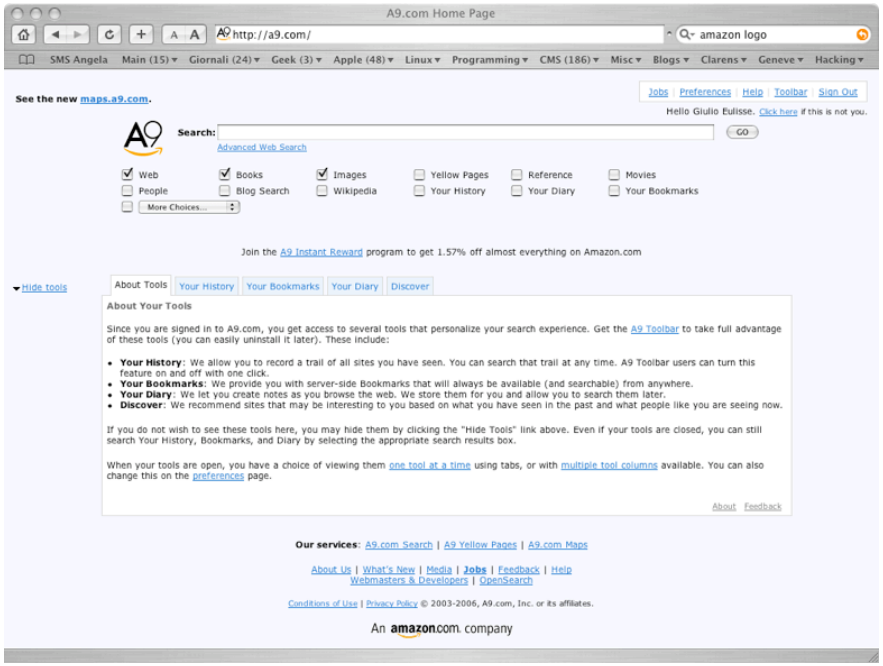

and a few others...