

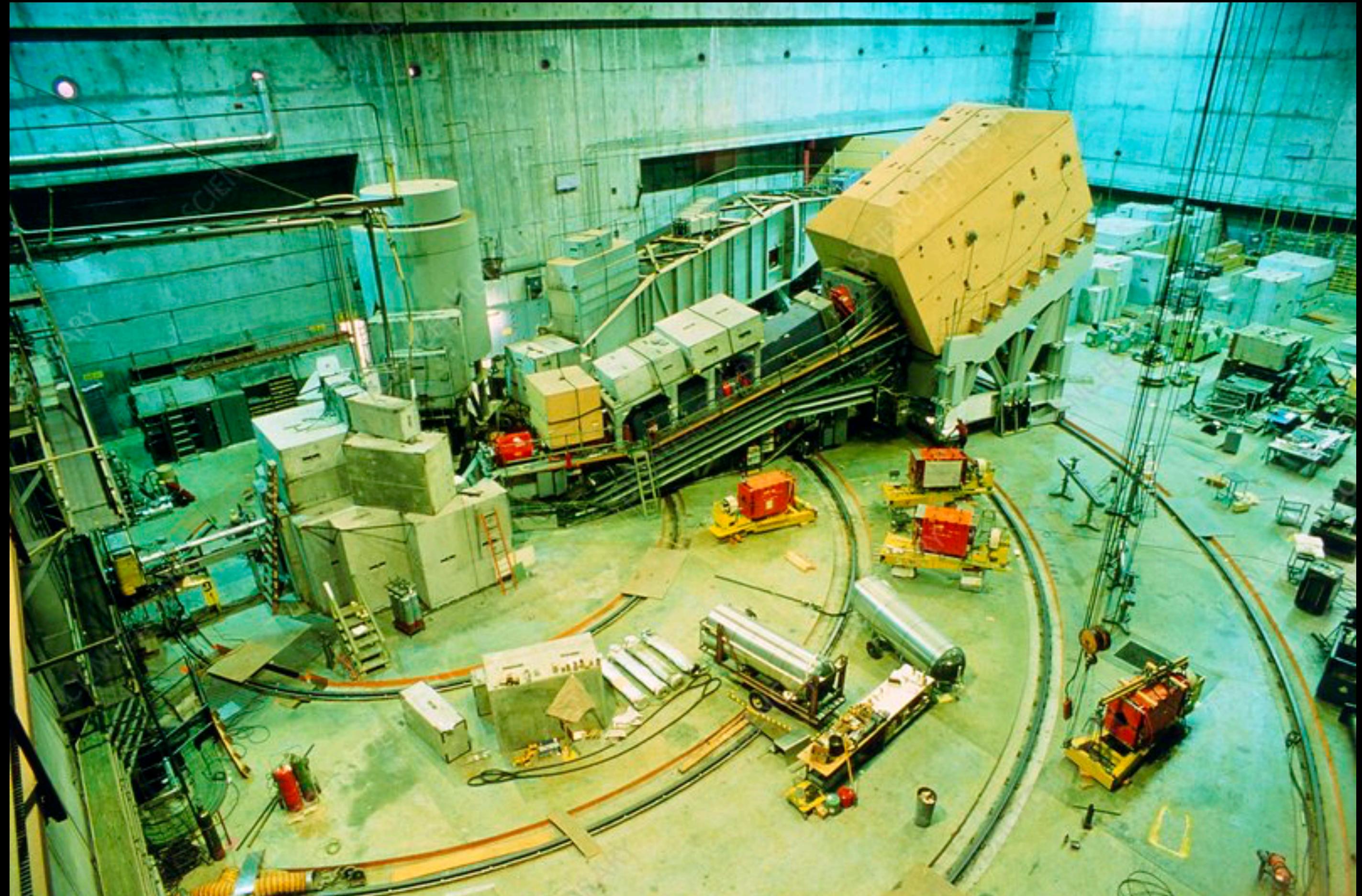
The birth and future of the World Wide Web

From an IBM 360 to your phone

Driving innovation

High-Energy Physics

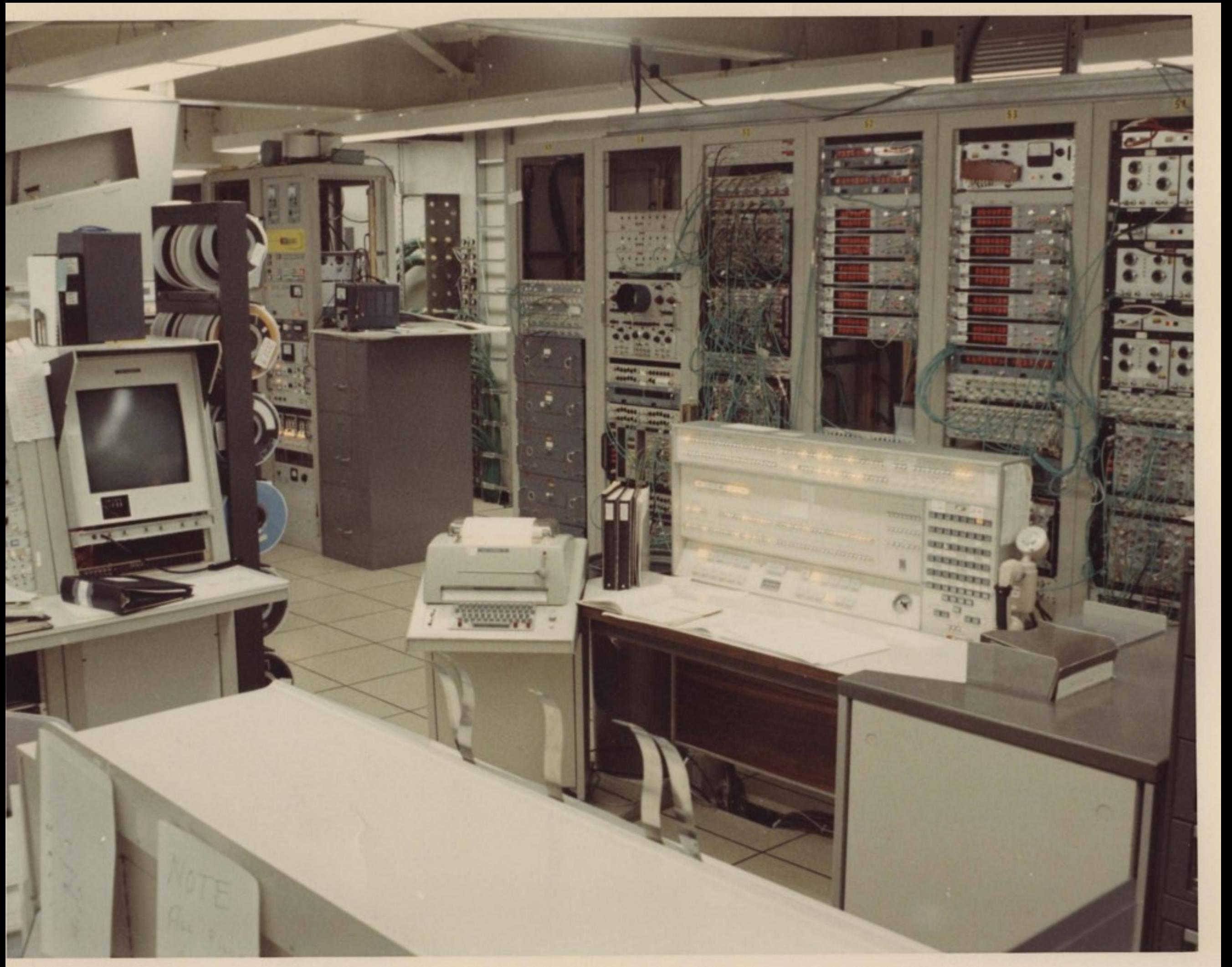
- Data acquisition
- Numerical analysis
- International collaboration



End Station A, Stanford Linear Accelerator Center

Counting House

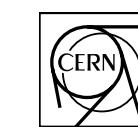
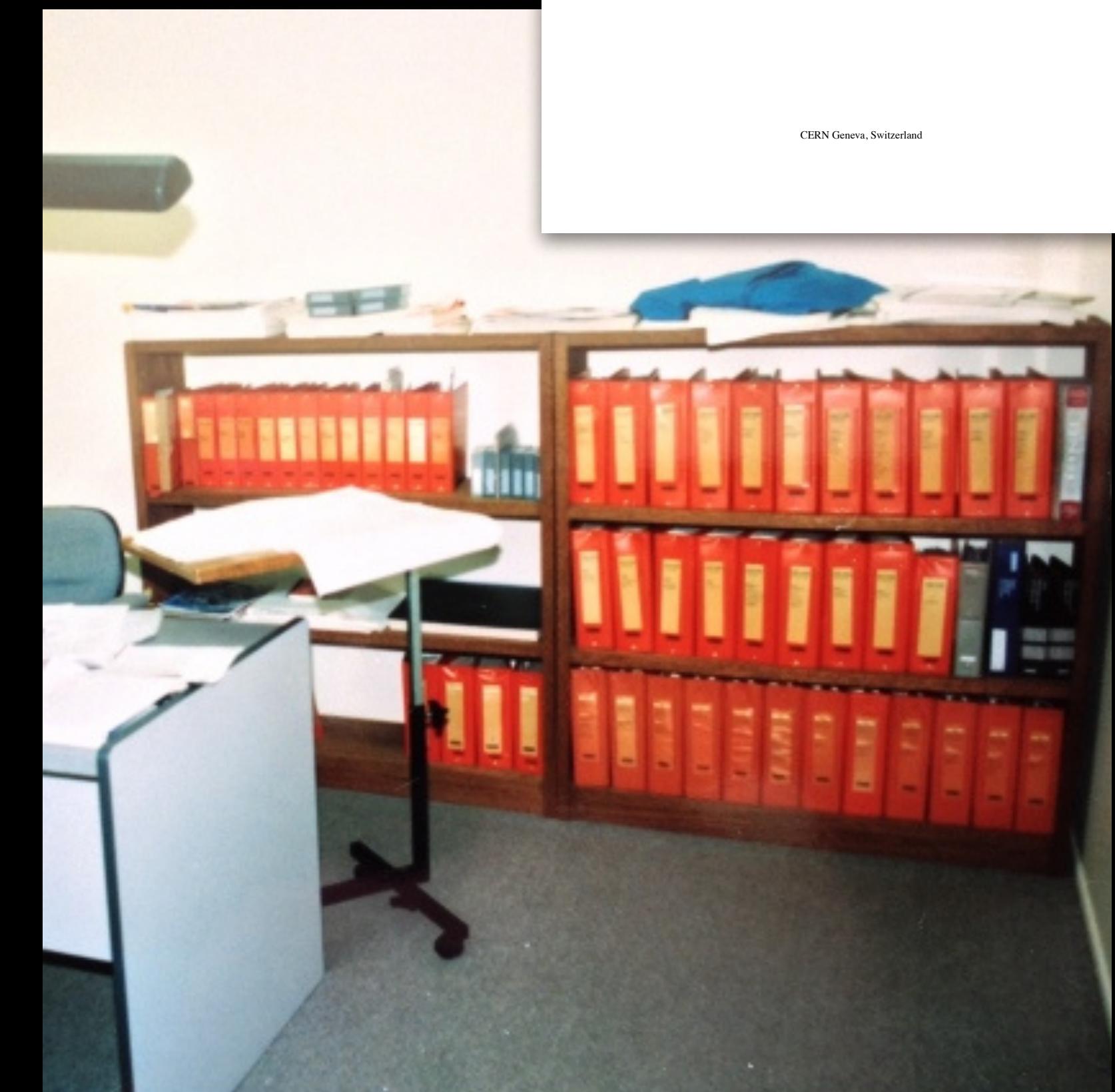
End Station A
ca. 1968



Credit: Martin Breidenbach

Documentation

Hard copy only!



CERN Program Library

CERNLIB

Short Writeups

Application Software and Databases
Computing and Networks Division

CERN Geneva, Switzerland



Breakthrough!

Documentation on demand

<https://line-mode.cern.ch/>

The World Wide Web project

WORLD WIDE WEB

The WorldWideWeb (W3) is a wide-area hypermedia[1] 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[2] of the project, Mailing lists[3] , Policy[4] , November's W3 news[5] , Frequently Asked Questions[6] .

What's out there?[7]Pointers to the world's online information, subjects[8] , W3 servers[9], etc.

Help[10] on the browser you are using

Software Products[11] A list of W3 project components and their current state. (e.g. Line Mode[12] ,X11 Viola[13] , NeXTStep[14] , Servers[15] , Tools[16] , Mail robot[17] , Library[18])

Technical[19] Details of protocols, formats, program internals etc

<ref.number>, Back, <RETURN> for more, or Help: |

Green?

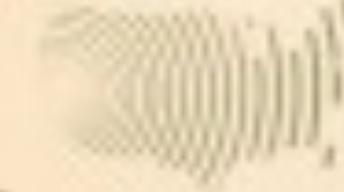
40x80 terminal

Main computing at Stanford:

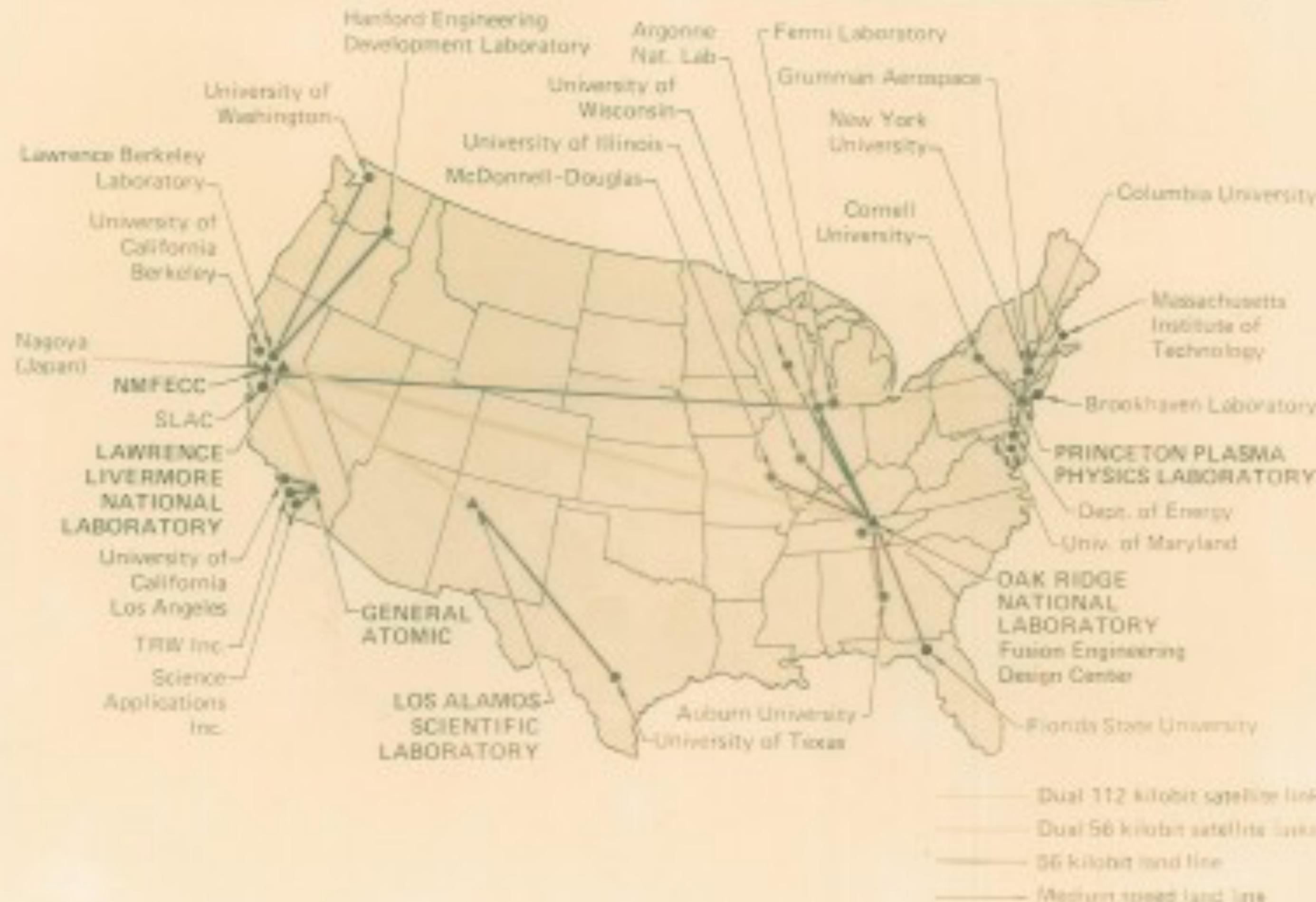
- IBM 360 mainframe
- Used up to June 1998



NMFECC



NATIONAL MFE NETWORK 1985



Early browsers

X-windows, 1992



Midas WWW Version 2.1

[File](#) [Postscript](#) [Navigate](#) [Customize](#) [Documents](#) [Manuals](#) [Help](#)

Title: Midas WWW Version 2.1

Document: <http://www-midas.slac.stanford.edu:80/midasv21/about.html>

Midas WWW Browser Version 2.1

You are using Midas WWW version 2.1. This is currently the most recent version, and superceeds version 2.0 and the totally obsolete version 1.0. This World Wide Web (WWW) browser is based on Midas 0.9. It is known to have several bugs and missing features. See also user feedback and gateway bugs.

New Features in version 2.1

- Full support for Mosaic style forms.

Known Bugs (to be fixed soon)

Missing Features (to be added in version 2.1)

- Still no support for selecting from the document window.
- Long documents get truncated in the display window (with a nasty warning message).
- Ability to customize menus (actually if you **Really** want to customize the menus you can already, but we don't recommend it since you will have to remember to get rid of all your customizations when you install the next version of MidasWWW. If you *still* want to do it, ask us how!)

Missing features (to be added one day?)

- Hypertext composer/editor
- Ability to produce beautiful postscript output
- Hypertext spell checker

Bug Reports

Please let us know of any other bugs you find, or nifty new features you think should be added.

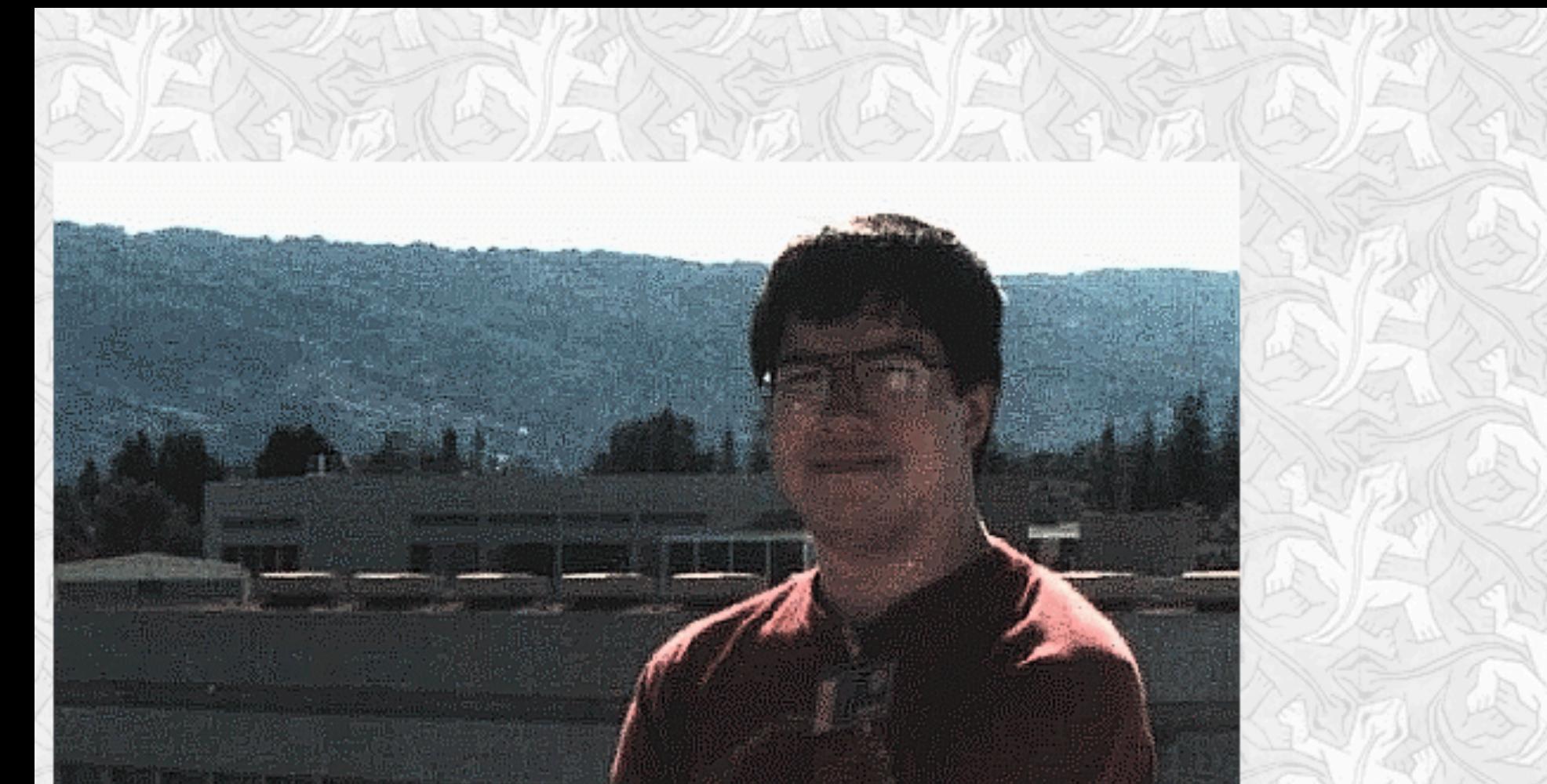
Keyword:

[Go Back](#) [Previous](#) [Next](#) [Save...](#) [Search...](#) [Clone](#) [Close Window](#)

Personal Pages

Early WWW

- From the Wayback Machine
- Hand edited text hosted by a central SunOS computer
- X-windows thin client



David C. Williams



[Personal information \(curriculum vitae, publications\)](#)



[Links related to my work on BaBar, SLD, and ZEUS](#)



[Links related to high-energy physics](#)



[Links to interesting things on the web](#)



[Information for my students in PHYSICS 221A](#)

davidw@scipp.ucsc.edu

Last modified: September 23, 2000

Hand coding With friendly comments!

```
1 <html>
2 <head>
3   <title>David C. Williams</title>
4   <meta name="Author" content="David C. Williams">
5   <meta name="Keywords" content="David C. Williams, home page, high energy
6     physics postdoc,
7       University of California at Santa Cruz,
8       ZEUS, SLD, BaBar, DESY, SLAC">
9   <meta name="Description" content="Home page for David C. Williams at SCIPP">
10  </head>
11
12  <!-- There is all sorts of nice stuff on the web.      -->
13  <!-- See: http://www.cco.caltech.edu/~cherish/images/  -->
14  <!-- for the site where I got this one. Perfectly free! -->
15
16  <body background="reptiles.gif">
17
18  <br>
20
21  <!-- Like my name gif? See www.coolttext.com to make your own. -->
22  <!-- To make it transparent, convert to gif with a small number -->
23  <!-- (like 32) bits, find the background color, and make it -->
24  <!-- transparent. On unix, use the "convert" command to do this. -->
25  <!-- Stuck with Windows? Hah hah, can't help you!        -->
26
27  
28  <hr>
29
30  <!-- When doing a list like below, it was important to crop -->
31  <!-- the "but" gif icons so that they were the same size. -->
32  <!-- Otherwise, things didn't line up properly.          -->
33
34  <p>
35  <a href="personal.html">
36    </a>
38  <a href="personal.html">
39    Personal information (curriculum vitae, publications)</a>
40  </p>
41
42
```

The early WWW Links were still a thing

 **Dave's internet links**

Here is a modest collection of links I've accumulated over the years.

Search Engines

Being old fashioned, I usually limit my web searches to the old favorites:

- For catagories, [yahoo](#) can't be beat.

- For a search engine, [altavista](#) is still a marvel.

- If you're desprete, [dejanews](#) will search netnews for you.


Odds and Ends

 America high-tech: don't miss [Dilbert](#) by Scott Adams.

Does your neighbor act a bit suspicious? You might want to see if you recognize him/her on [this page](#)

30-something and from the USA? Recover all your suppressed memories with [Schoolhouse Rock](#). J

WWW scripting

cgi-bin, 2007

- Apache / perl / cgi
 - shell scripts
 - routing = filename
 - stdout = http response

(This is not good code)

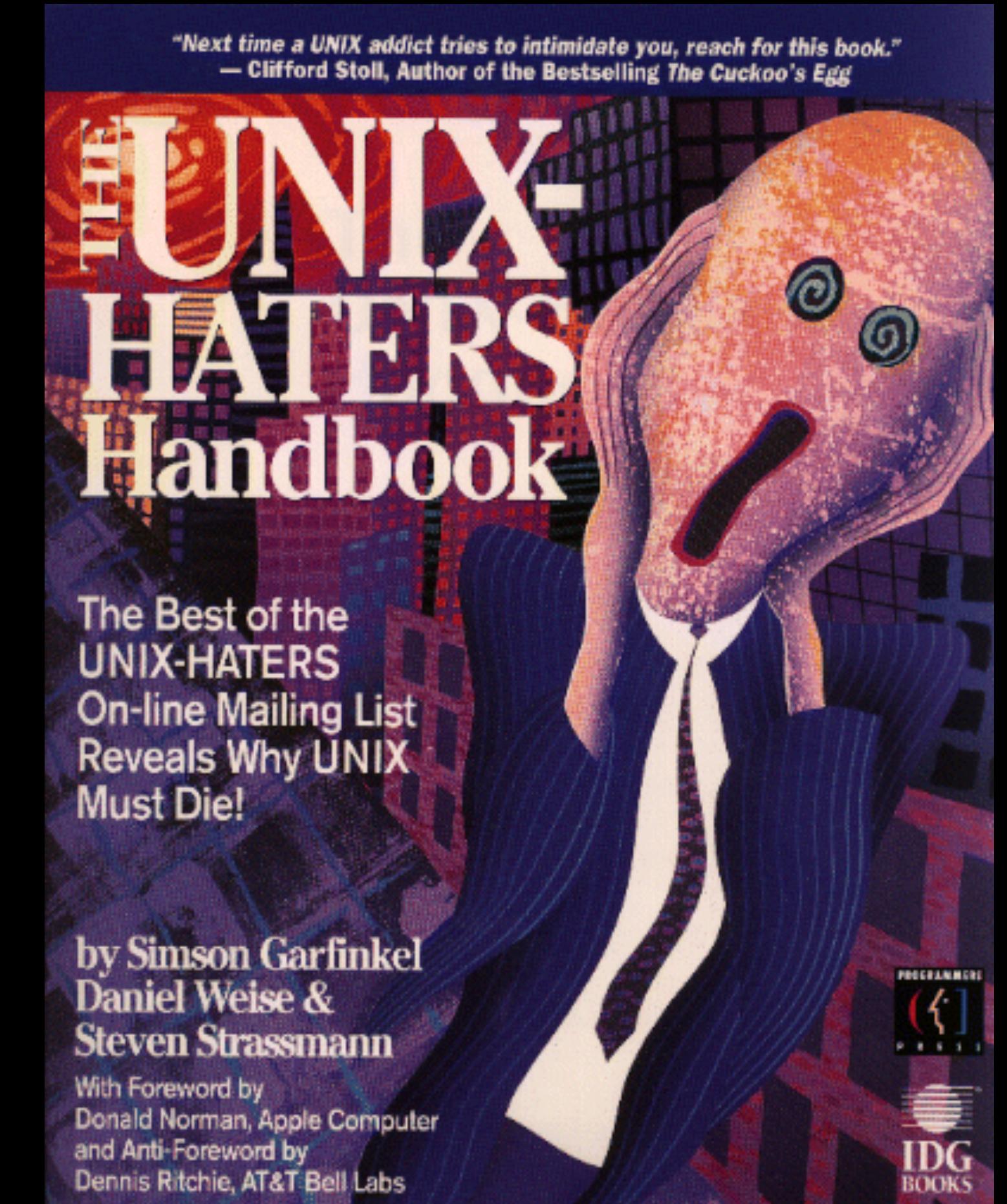
Revision 6697, 870 bytes checked in by dwilliams, 13 years ago (diff)
Includes new reaction library
Property svn:executable set to *

Line	Code
1	<code>#!/usr/bin/perl</code>
2	<code>#</code>
3	<code># A small web page for displaying SMILES and SIGNATURE strings</code>
4	<code>#</code>
5	<code>use CGI qw/:standard :html3/;</code>
6	<code>use strict;</code>
7	<code>#</code>
8	<code>#</code>
9	<code># Setup CGI</code>
10	<code>#</code>
11	<code>my \$query = new CGI;</code>
12	<code>#</code>
13	<code>my \$smiles = \$query->param('smiles');</code>
14	<code>my \$sig = \$query->param('sig');</code>
15	<code>#</code>
16	<code># Setup web page</code>
17	<code>#</code>
18	<code>my \$title = "Smarts and Signature";</code>
19	<code>#</code>
20	<code>print header;</code>
21	<code>print start_html(-title=>\$title);</code>
22	<code>#</code>
23	<code># Draw information</code>
24	<code>#</code>
25	<code>print "<TABLE CELLPADDING=2 CELLBORDER=1>\n";</code>
26	<code>print "<TR><TD ALIGN=\"right\">Smiles:</TD><TD><CODE>". \$smiles . "</CODE></TD></TR>\n";</code>
27	<code>print "<TR><TD ALIGN=\"right\">Signature:</TD><TD><CODE>". \$sig . "</CODE></TD></TR>\n";</code>
28	<code>print "</TABLE>\n";</code>
29	<code>#</code>
30	<code># Close button</code>
31	<code>#</code>
32	<code>print "<DIV STYLE=\"position:absolute;right:4px;bottom:4px\">\n";</code>
33	<code>print \$query->startform(-name=>"close");</code>
34	<code>print \$query->button(-name=>"close", -onClick=>"window.close()");</code>
35	<code>print \$query->endform;</code>
36	<code>print "<DIV>\n";</code>
37	<code>print \$query->end_html;</code>

Security?

The days of innocence

```
Options ExecCGI  
SetHandler cgi-script  
  
<Directory /home/*/*public_html/cgi-bin>  
Options ExecCGI  
SetHandler cgi-script  
</Directory>
```



1992

<https://homes.cs.washington.edu/~weise/unix-haters.html>

Migration

Better CGI

2010–2016

Embedded python (mod_cgi)

jquery

ROCA

```
absorbance_worksheet.py 10.4 KB  Edit Web IDE Replace Delete     
1 #!/usr/bin/python  
2 #  
3 import sys, cgi, os, string, urllib, re  
4 import cgitb; cgitb.enable(1)  
5 import style, access, vcddefs
```

```
375 def web_fit( form, session ):  
376  
377     html_template = """\n378 <?xml version="1.0" encoding="UTF-8"?>\n379 <!DOCTYPE html\n380 PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"\n381 "DTD/xhtml1-strict.dtd">\n382 <html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en" lang="en">\n383 <head>\n384 <title>Absorbance Worksheet</title>
```

```
426     #  
427     # Make web page  
428     #  
429     print session.HTMLHeader()  
430     print string.Template(html_template).substitute(  
431         login      = session.LoginHTML(),  
432         logo       = style.footer_str(version),  
433         plots      = u"\n".join(plots)  
434     )  
435  
436  
437  
438  
439 form = cgi.FieldStorage()  
440 session = access.GetSession()  
441  
442  
443 action = form.getvalue('action','Start')  
444  
445  
446 if action in ('Start','Reset Form'):  
447     web_start( form, session )  
448  
449 elif action == 'Submit':  
450     web_fit( form, session )  
451  
452 else:  
453     raise Exception( "Unrecognized action" )
```

Migration

Central routing

2016–present
pyramid / python3
c++ → python bindings

```
absorbance_worksheet.py 11.9 KB Edit Web IDE Replace Delete ↗ ↘ ↙ ↘ ↘ ↘
```

```
from pyramid.response import Response
from pyramid.view import view_config
import os, string, re
from . import style, access, vcddefs
```

```
399     #
400     # Make web page
401     #
402     return session.HTMLResponse(string.Template(html_template).substitute(
403         login      = session.LoginHTML(),
404         logo       = style.footer_str(version),
405         plots      = "\n".join(plots)
406     ))
407
408
409
410
411 @view_config(name='absorbance_worksheet')
412 @view_config(name='absorbance_worksheet.py')
413 def view(request):
414     "Analyze absorbance from plate reader"
415     form = request.params
416     session = access.Session(request)
417
418     action = form.get("action", "Start")
419
420     if action in ('Start', 'Reset Form'):
421         return web_start( form, session )
422
423     elif action == 'Submit':
424         return web_fit( form, session )
425
426     else:
427         raise Exception( "Unrecognized action" )
```

Deployment

Present time

Docker / gunicorn
nomad / Consul / fabio

VE-00093-1 | Substance View

vcdwww.verseon.com/substance_view?dbase=vcddb%3A%3Acompound&id=93

dwilliams | Logout

Submit

Substance View

VE-00093-1
Substance Id #00093
Compound Id 708
Isomer Id 1374244
Salt Freebase
Lot 1
Status Untracked
Inventory N/A
Supplier LKT Labs
Catalog A6823
Formula C₂₃H₃₆N₆O₅S
Formula Weight 508.64
Molecular Weight 508.64
Measured Weight
xlogP -0.97
Purity

Queries [View All Lots](#) [Prev](#) [Next](#)
Data Sheet [Preview](#) [PDF](#) [Strings](#) [Exact Mass](#)
Label [Print Old](#) [Print](#) You may need the print script ([linux](#), [windows](#))
Image [300x300](#) [png](#) [View](#)

Laboratory Results

Primary screening	Average or Limit		Number Tests
	IC50 μM	Ki μM	
Thrombin Inhibition	0.205 ± 0.105	0.041 ± 0.021	421 / 435
Thrombin Inhibition (1 day in buffer)	0.105	0.105	1 / 1
Thrombin Inhibition (2 days in buffer)	0.0996	0.0996	1 / 1
Thrombin Inhibition, D ₂ O buffer	0.213	0.0426	1 / 1
Thrombin Inhibition, non-glycosylated protein in D ₂ O buffer	0.366	0.0732	1 / 1
Thrombin Inhibition, non-glycosylated protein	0.593	0.119	1 / 1
Thrombin Inhibition (BSA, 40 mg/mL)	0.240 ± 0.063	0.240 ± 0.063	7 / 7
Thrombin Inhibition (HAGP, 1 mg/mL)	0.0799	0.0799	1 / 1
Thrombin Inhibition, rat	0.160 ± 0.118	0.160 ± 0.118	4 / 4
Thrombin Inhibition, mouse	0.520 ± 0.048	0.104 ± 0.010	2 / 2
Thrombin Inhibition, bovine	0.220 ± 0.061	0.0440 ± 0.0123	4 / 4
Thrombin Inhibition, canine	0.132 ± 0.044	0.132 ± 0.044	3 / 4
Thrombin Inhibition, porcine	0.0389 ± 0.0038	0.0389 ± 0.0038	2 / 2
Thrombin Inhibition No Preincubation	0.238 ± 0.035	0.0475 ± 0.0071	3 / 3
KLKB1 Inhibition	> 100	> 24	1 / 1

Secondary screening	Average or Limit		Number Tests
	IC50 μM	Ki μM	
Factor VIIa Inhibition	> 100	> 91	4 / 4
Factor IXa Inhibition	> 100	> 19	2 / 2

Finally! A decent code editor

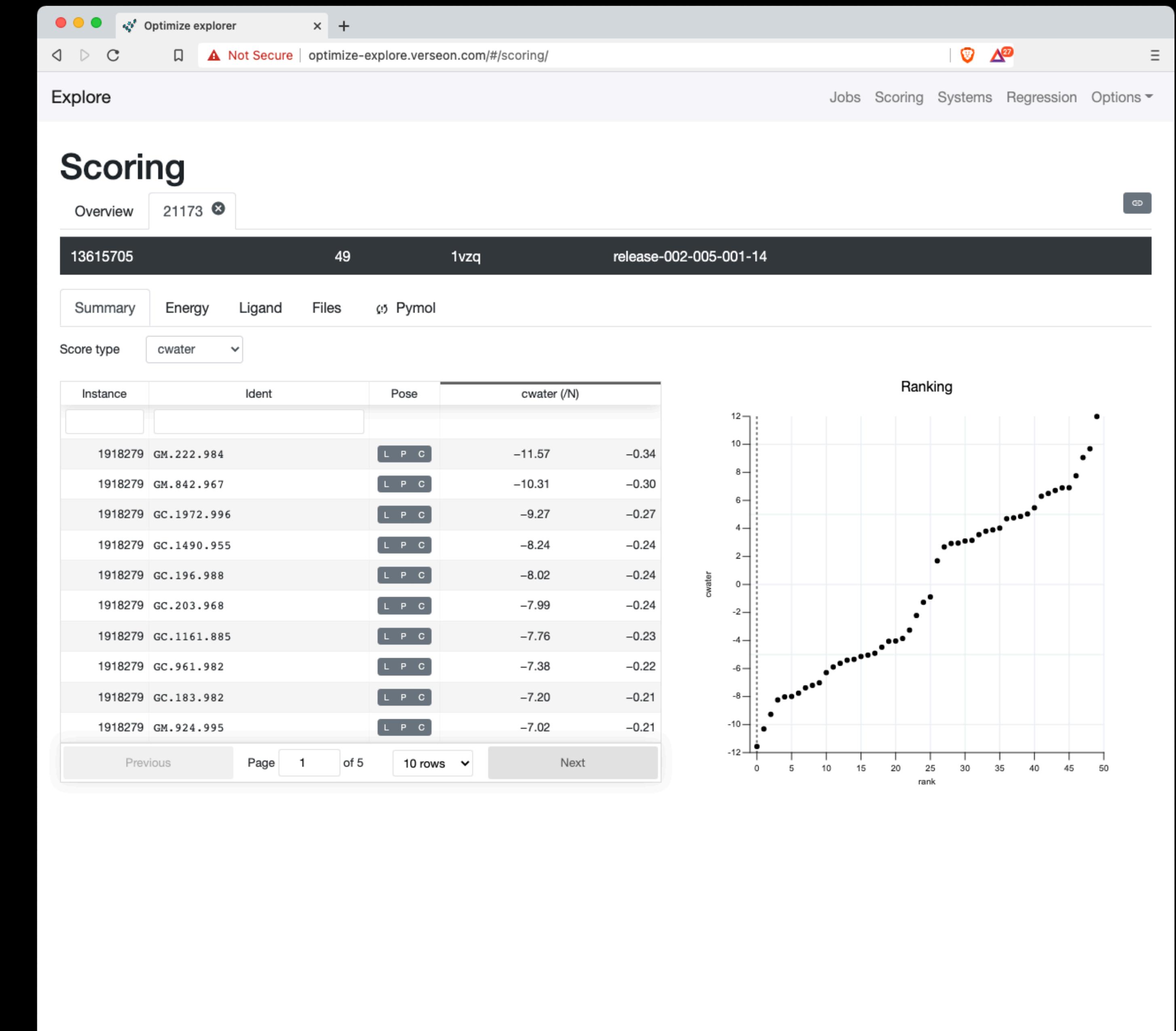
How did Microsoft become cool?

```
county.py — covidweb
server > drivers > county.py > fetchData
3 import numpy as np
4 from datetime import date
5 from os import path
6 from flask import current_app as app
7 import redis, requests, time, pyarrow
8
9 def connect():
10     return redis.Redis( host=app.config['REDIS_HOST'], port=app.config['REDIS_PORT'] )
11
12 def fetchData(rconn):
13     context = pyarrow.default_serialization_context()
14
15     # Check date of main dataframe
16     #
17     expires = rconn.hget("county", "expires")
18     if expires and time.time() < float(expires):
19         return context.deserialize(rconn.hget("county", "dataframe"))
20
21     #
22     # Fetch new copy
23     #
24     dt = pd.read_csv("https://github.com/nytimes/covid-19-data/blob/master/us-counties.csv?raw=true")
25     dt['dt'] = pd.to_datetime(dt.date, format="%Y-%m-%d")
26
27     #
28     # Save
29     #
30     rconn.hset("county", "dataframe", context.serialize(dt).to_buffer().to_pybytes())
31     rconn.hset("county", "expires", str(time.time() + 600.0))
32     return dt
33
34
35 def fetchNames(rconn):
36     context = pyarrow.default_serialization_context()
37
38     if rconn.exists("county", "names"):
39         return context.deserialize(rconn.get("county", "names"))
40
41     dt = fetchData(rconn)
42     counties = dt.filter(items=("state", "county")).drop_duplicates()
43
44     rconn.hset("county", "names", context.serialize(counties).to_buffer().to_pybytes())
45     return counties
46
47
48 def fetchCounty(rconn, state, county):
49     context = pyarrow.default_serialization_context()
50
```

Ln 21, Col 1 Spaces: 4 UTF-8 LF Python ⚡ Go Live ⚡ [off]

New tool Research group

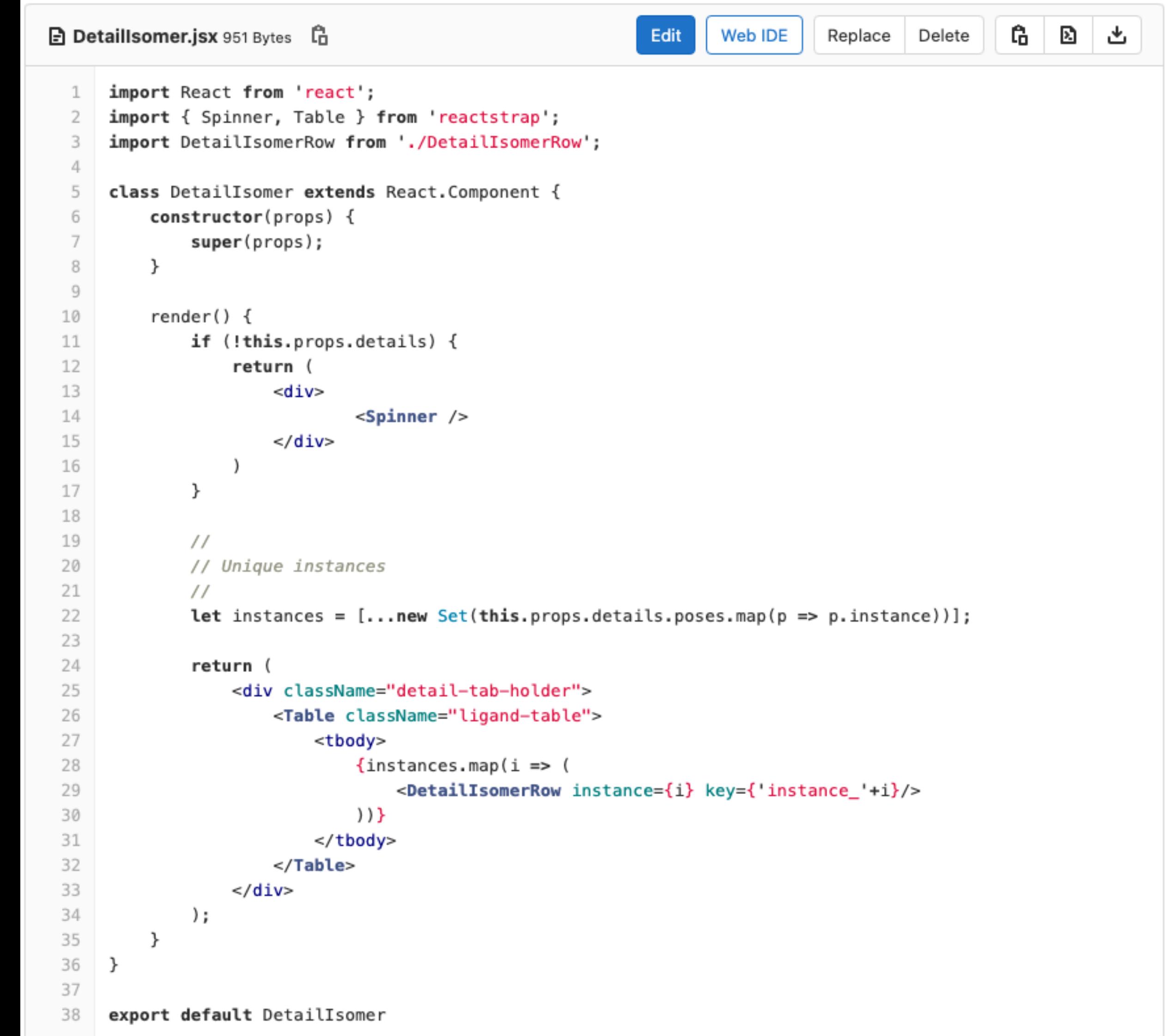
React / Redux / vx
npm / webpack
flask API



JSX

HTML integration

Comments in javascript!



The screenshot shows a code editor window with the following details:

- Title Bar:** DetailIsomer.jsx 951 Bytes
- Toolbar:** Edit, Web IDE, Replace, Delete, and several icons for file operations.
- Code Area:** A large text area containing a React component named `DetailIsomer`. The code uses JSX syntax to render a table of data. It includes several comments, notably multi-line comments starting with `//` and a block comment starting with `/*`.

```
1 import React from 'react';
2 import { Spinner, Table } from 'reactstrap';
3 import DetailIsomerRow from './DetailIsomerRow';
4
5 class DetailIsomer extends React.Component {
6   constructor(props) {
7     super(props);
8   }
9
10  render() {
11    if (!this.props.details) {
12      return (
13        <div>
14          <Spinner />
15        </div>
16      )
17    }
18
19    /*
20     * Unique instances
21     */
22    let instances = [...new Set(this.props.details.poses.map(p => p.instance))];
23
24    return (
25      <div className="detail-tab-holder">
26        <Table className="ligand-table">
27          <tbody>
28            {
29              instances.map(i => (
30                <DetailIsomerRow instance={i} key={'instance_'+i}/>
31              ))
32            }
33          </tbody>
34        </Table>
35      );
36    }
37
38  export default DetailIsomer
```

Software Engineering #1

Coupling

Low coupling = reliability, maintainability

Why were these tools popular?

- Perl/CGI
- PHP

Why are pylons/django templates annoying?

What is JSX trying to achieve?

```
if (!this.props.details) {  
  return (  
    <div>  
      <Spinner />  
    </div>  
  )  
}
```

Software Engineering #2

Referential transparency

To “update” a React component, you alter a property

```
constructor(props) {  
  super(props);  
}
```

Why this design limitation?

How does React deal with changes of state?

What part of javascript in practice causes the most programmer confusion?

Conclusion

Technology is not created in a vacuum

The WWW was born from a specific technological need

There is a reason why bad tools become popular

Good tools support good practice