Database for construction and tests of End Cap Muon chambers.

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Systems considered:

- CRISTAL (Objectivity)
- ROOT
- EDMS
- ORACLE
- MySQL
- PostgreSQL

The best choice:

ORACLE at CERN

Oracle

Oracle was selected by CERN in 80-s.

Long time available and well developped system.

Very good support.

Many tools

*(like SQL, SQL*Plus, PL/SQL, precompilers (Pro*FORTRAN, Pro*C/C++ ...), JDBC, OAS, iAS, Oracle XML Developer Kit, ...)*

Was designed as **RDBMS**
- Relational Database Management System.

Information - in **Tables**

Oracle - new features

Since version 8 - new features.

Unstructured data - LOB (Large OBjects (up to 4 Gbytes)):

- BLOB (Binary Large Objects)
- CLOB (Character Large Objects)
- BFILE (Reference to a file)

Internet access $->$ Oracle HTTP Server.

BLOB + Internet access

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Upload and download files.

New coming version 9i - object oriented

Currently in use:
Oracle 8i
Oracle 9i Application Server

ORACLE at CERN

Public Services:

Central Database - General purpose environment
Development Database - Test and deployment of new applications
Case Database - Designer/2000 environment

Private Services:

ALARM Oracle database
CHORUS Oracle database
CRYOGENICS Oracle database
EDMS Oracle database
IT/CS Oracle database
LEP logging Oracle database
LEP measurements Oracle database
REMEDY Oracle database
Radio Frequency Oracle database
SL division development Oracle database
SPS measurements Oracle database
Tape Management System Oracle database

Sub Databases

- 1) Anode boards tests.
- 2) FAST site tests (Final Assembly and System Tests).
- 3) ALCT and CLCT/TMB tests.
- 4) CERN site tests.
- 5) Electronic boards tracking for CSC assembly (MySQL)

Organization

Each sub DB has separate account in CERN Oracle Central Database.

Interconnection

Mutual access by granting rights.

Access to Oracle

1. Interactive: SQL*PLUS.

SQL, PL/SQL stored procedures.

2. Two tiers: client - server.

Client:

Pro*FORTRAN, Pro*C/C++
ODBC
JDBC

3. Three tiers: Oracle iAS (internet Application Server).

Client:

Calls PL/SQL stored procedures by URL addresses

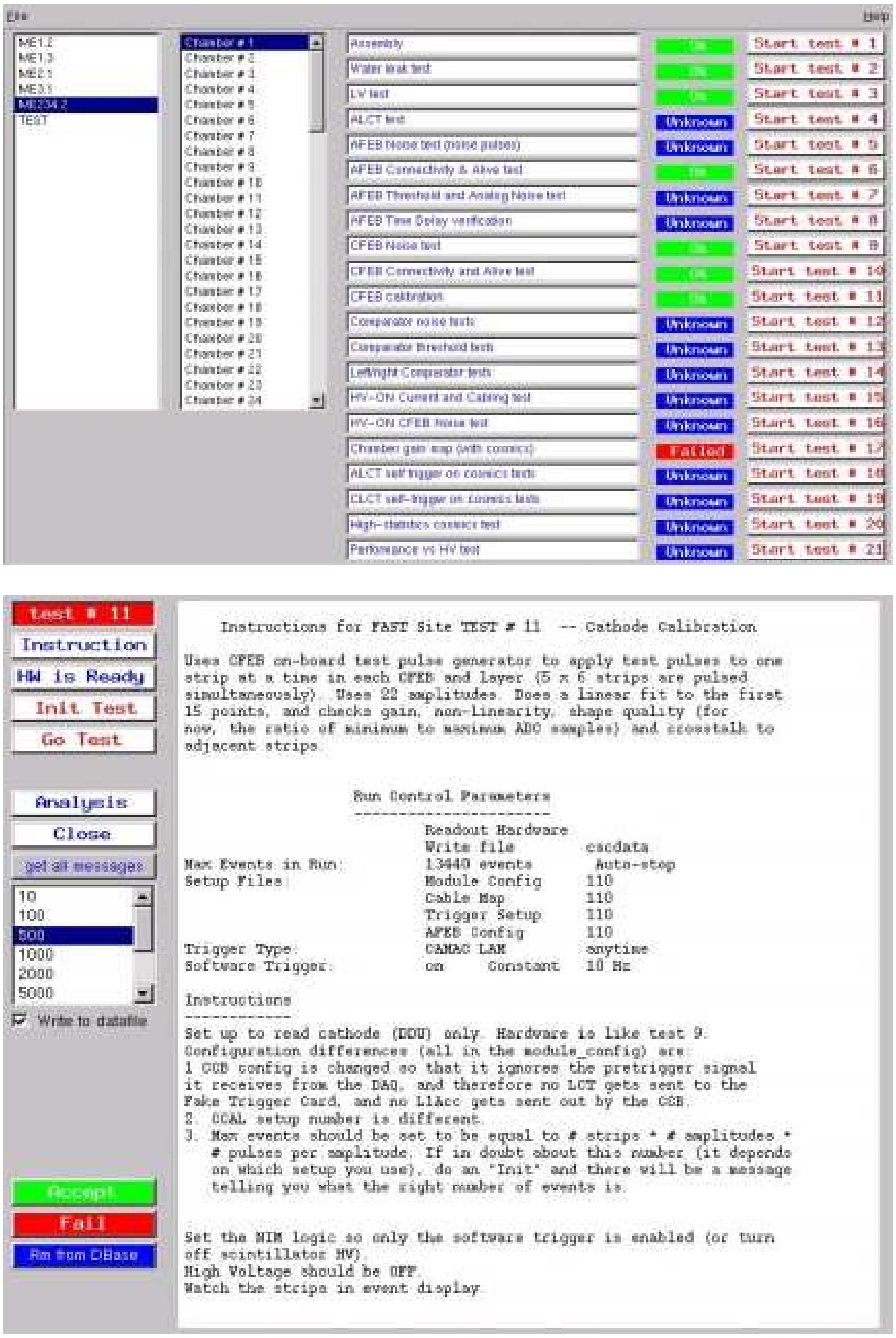
FAST site tests DB

Access through Two tiers model.

CSC test results are collected and viewed at FAST sites with Test Manager. Approved data is sent to central database.

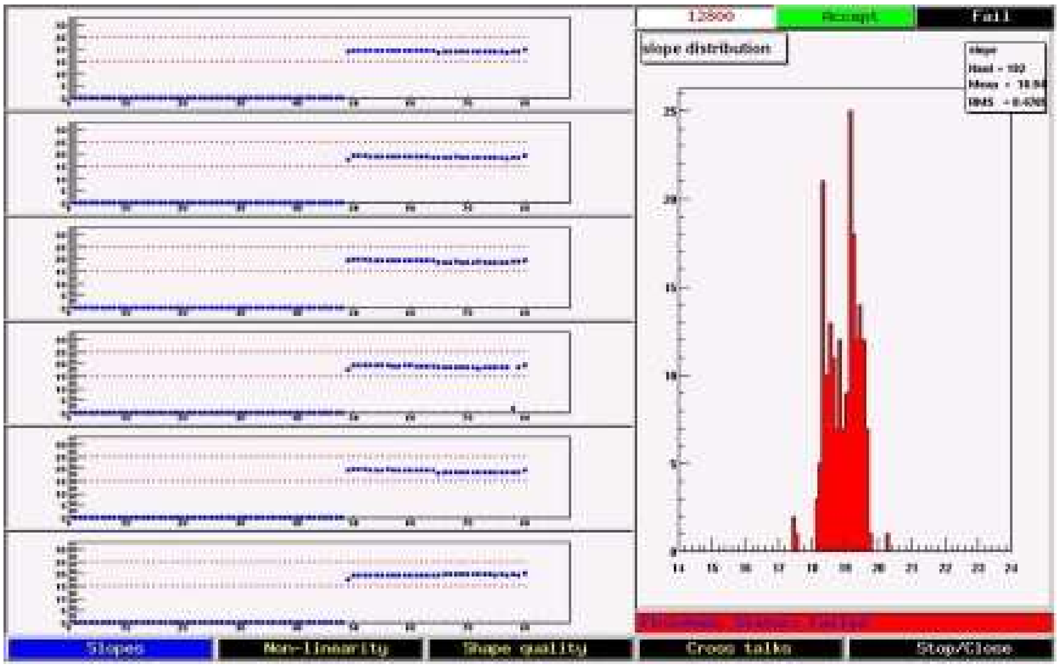
- Database structure (tables in Oracle) is created by independent C++ program.
- Data is sent to Oracle through ODBC driver, installed at each FAST site.
- Graphic files are sent to the Web server. Links to these files are stored in the database tables.
- Data from database is accessed via Web with Java applets and JDBC.

FAST sites - Test Manager



Test Manager interface and example of test

FAST sites - Test Manager



Sample plot of test results

FAST sites - data flow

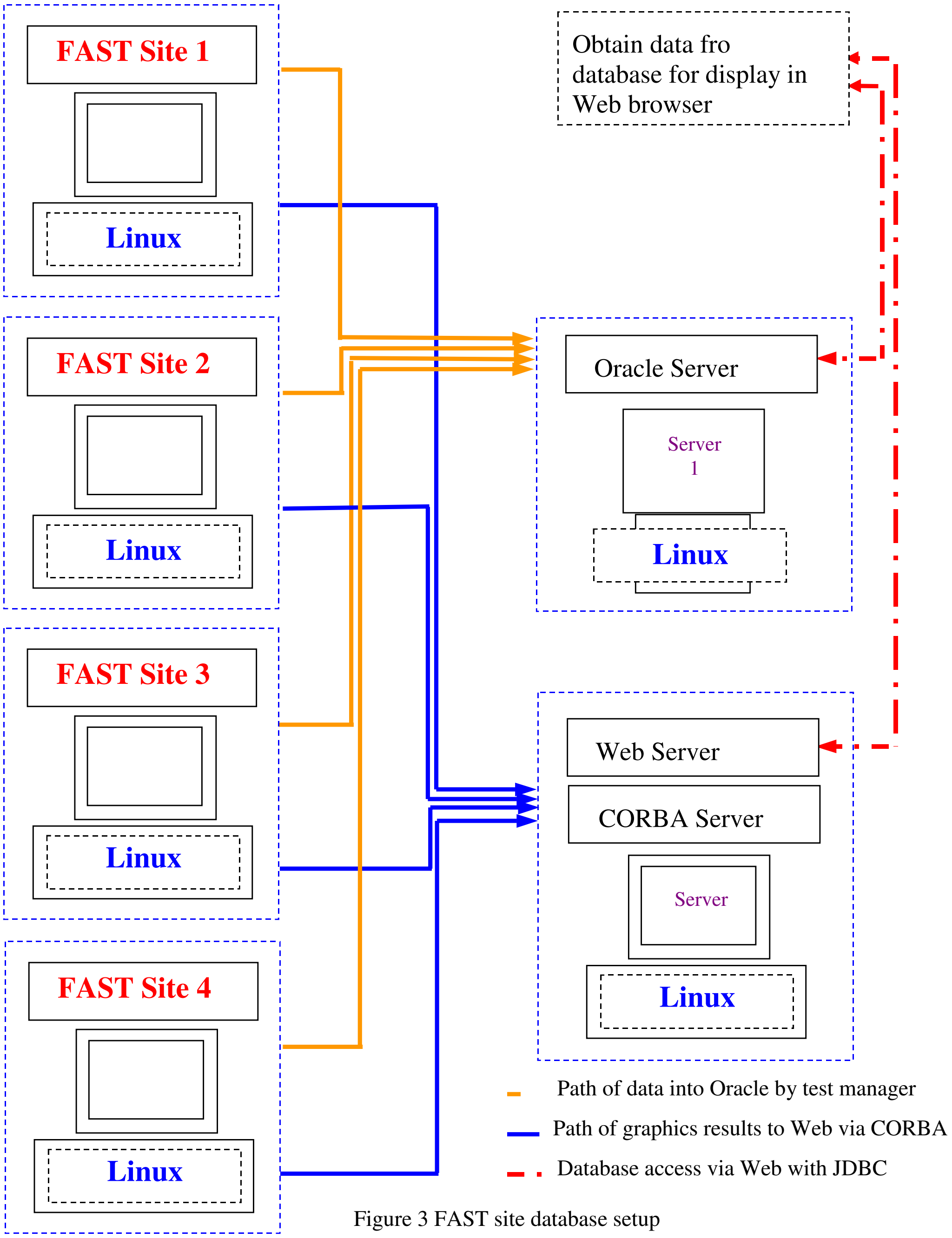


Figure 3 FAST site database setup

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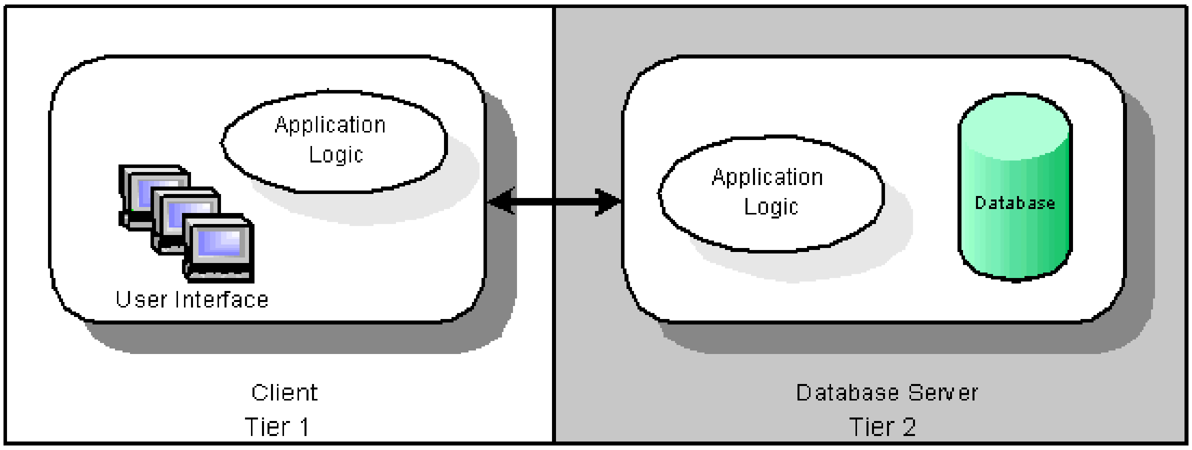
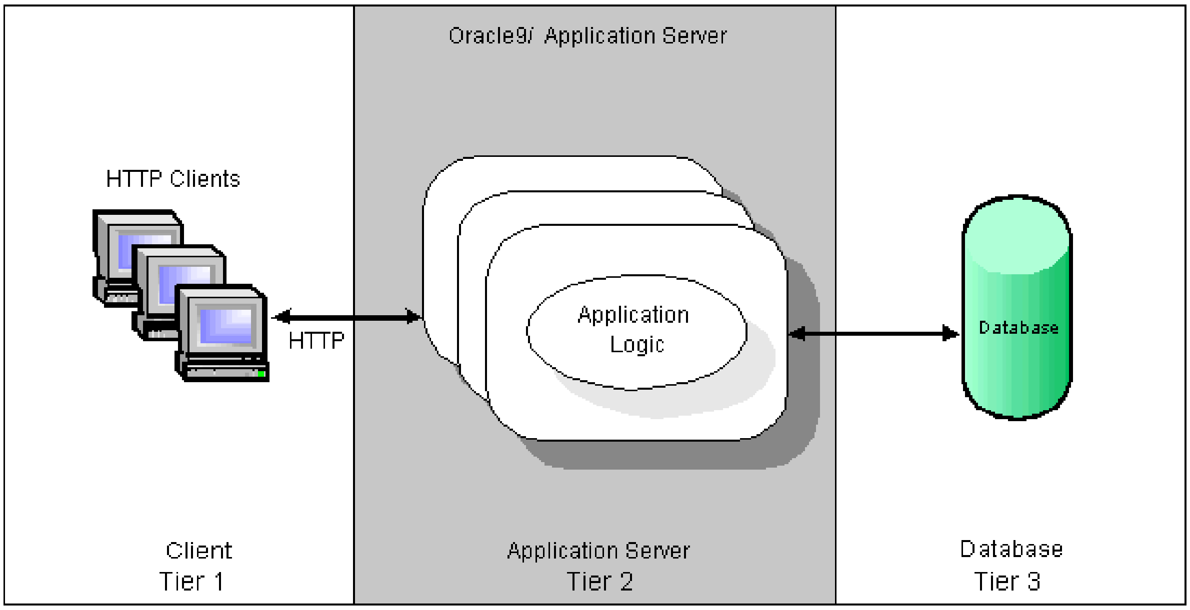
Oracle9i Application Server Architecture

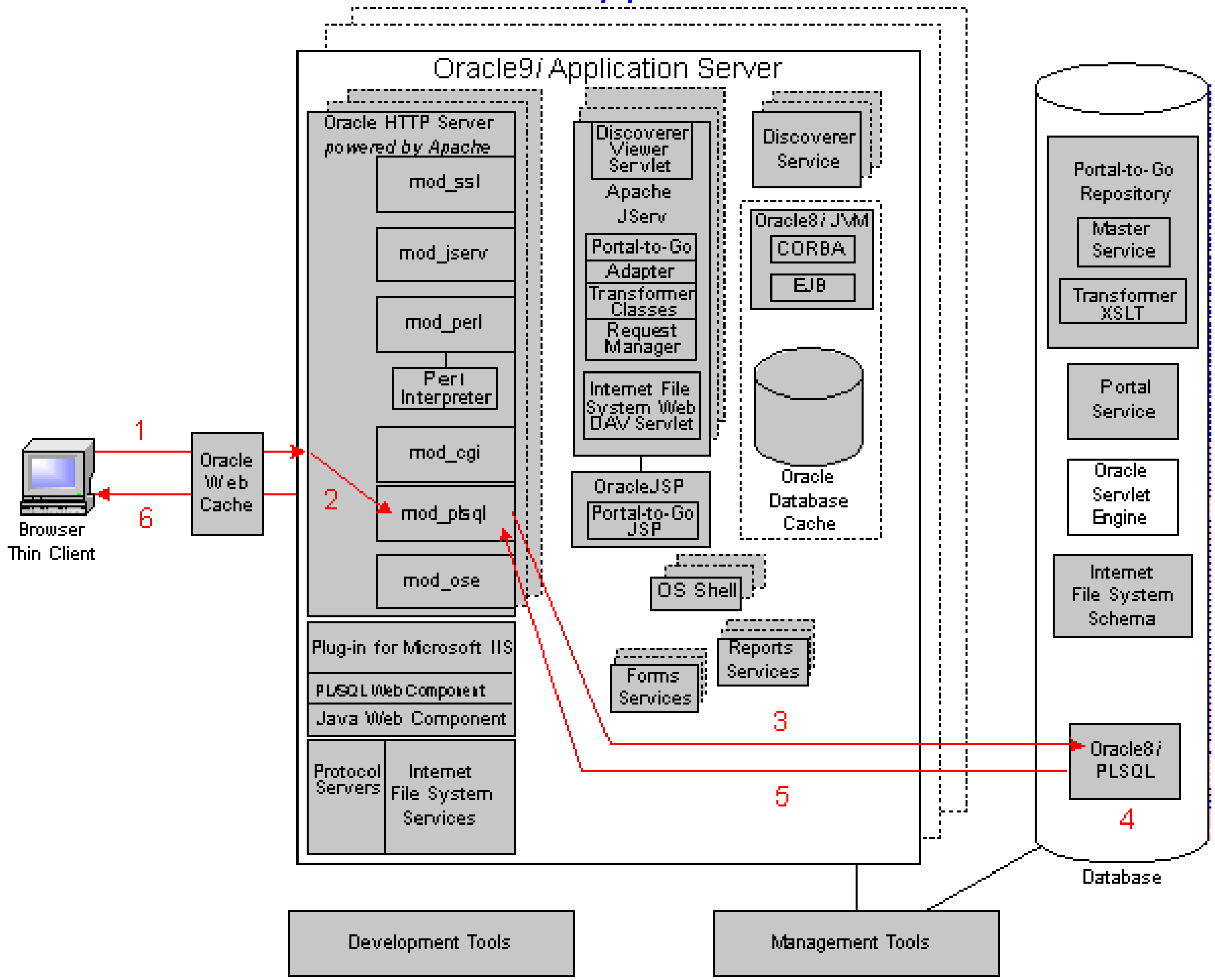
Two-Tier Computing Model



Three-tier Oracle9i Application Server Architecture



Oracle9i Application Server



9i Application Server

1.The Oracle HTTP Server receives a PL/SQL Server Page request, through Oracle Web Cache, from a client browser.

2.The Oracle HTTP Server routes the request to mod_plsql.

3.The request is forwarded by mod_plsql to Oracle8i PLSQL. By using the configuration information stored in DAD (Database Access Descriptor), mod_plsql connects to the database, prepares the call parameters, and invokes the PL/SQL procedure in the database.

4.The PL/SQL procedure generates an HTML page using data and stored procedures accessed from the database.

5.The response is returned to mod_plsql.

6.The Oracle HTTP Server sends the response, through Oracle Web Cache, to the client browser.

Access scheme

ORACLE

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Accessed from PL/SQL stored procedures

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Accessed from HTTP Server (iAS)

$\Downarrow$

URL addresses:

http://oraweb03.cern.ch:9000/pls/cms_anode_boards.dev/display.board
http://oraweb03.cern.ch:9000/pls/cms_anode_boards.dev/board_files.board_list?p_board_num=20001
http://oraweb03.cern.ch:9000/pls/cms_anode_boards.dev/board_files.board_select

PL/SQL Web Toolkit - facility to create HTML pages.

Packages:

htp, htf - generate HTML tags

owa - subprograms and functions

Anode boards DB

Access through Oracle9i Application Server.

Main mode: saving files.

Files contain measurements and results of analysis.
Each board - few files (text (numbers) + pictures).
Pictures can be of any format: jpeg, gif, ps, compressed ps.

HTML page: select board number

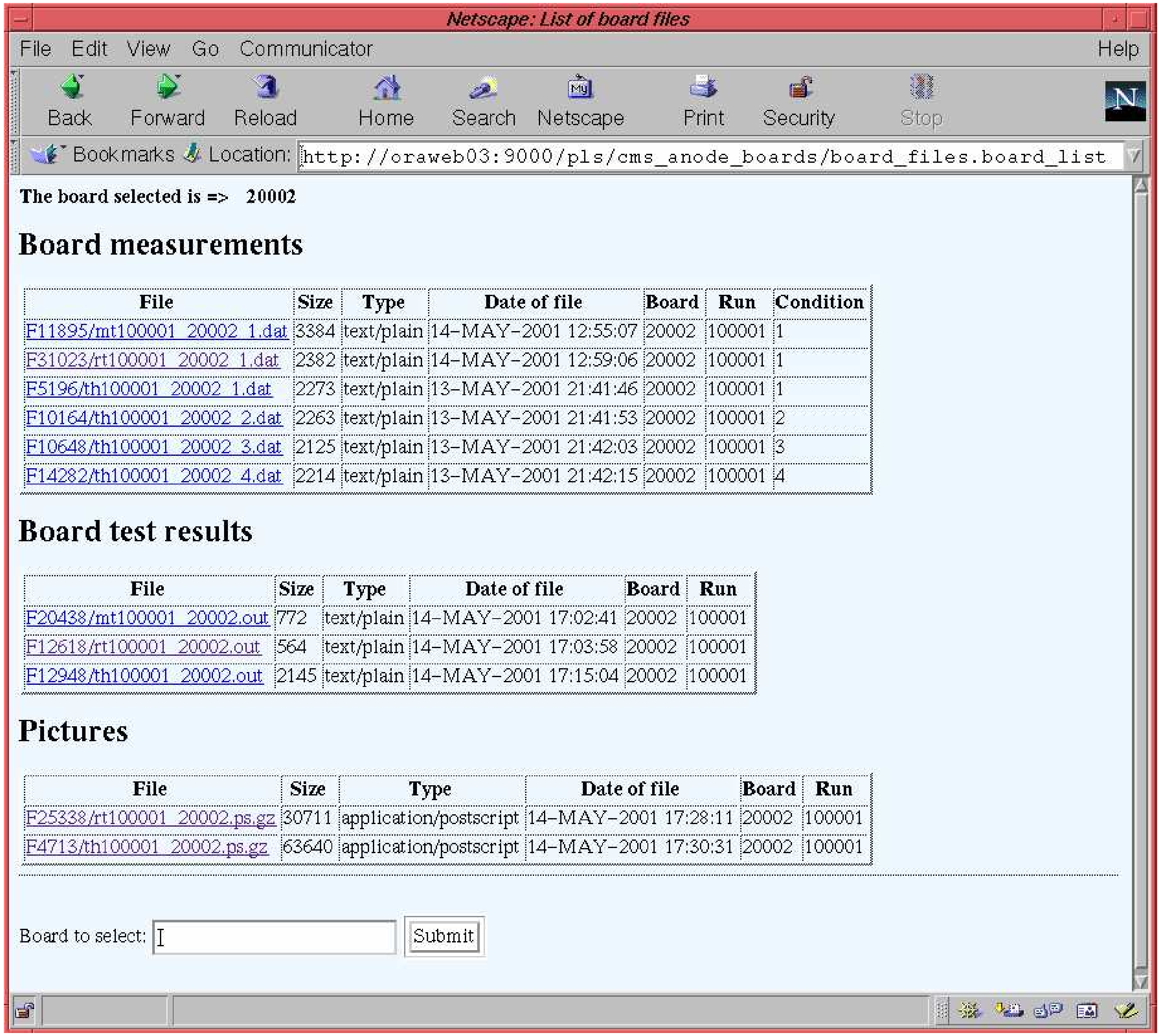
$\Downarrow$

list of files for requested board

Click on file name $\Rightarrow$ view
Shift-click $\Rightarrow$ save in external file

Main results and status of boards - in tables.

Netscape access



The board selected is => 20002

Board measurements

File	Size	Type	Date of file	Board	Run	Condition
F11895/mt100001_20002_1.dat	3384	text/plain	14–MAY–2001 12:55:07	20002	100001	1
F31023/rt100001_20002_1.dat	2382	text/plain	14–MAY–2001 12:59:06	20002	100001	1
F5196/th100001_20002_1.dat	2273	text/plain	13–MAY–2001 21:41:46	20002	100001	1
F10164/th100001_20002_2.dat	2263	text/plain	13–MAY–2001 21:41:53	20002	100001	2
F10648/th100001_20002_3.dat	2125	text/plain	13–MAY–2001 21:42:03	20002	100001	3
F14282/th100001_20002_4.dat	2214	text/plain	13–MAY–2001 21:42:15	20002	100001	4

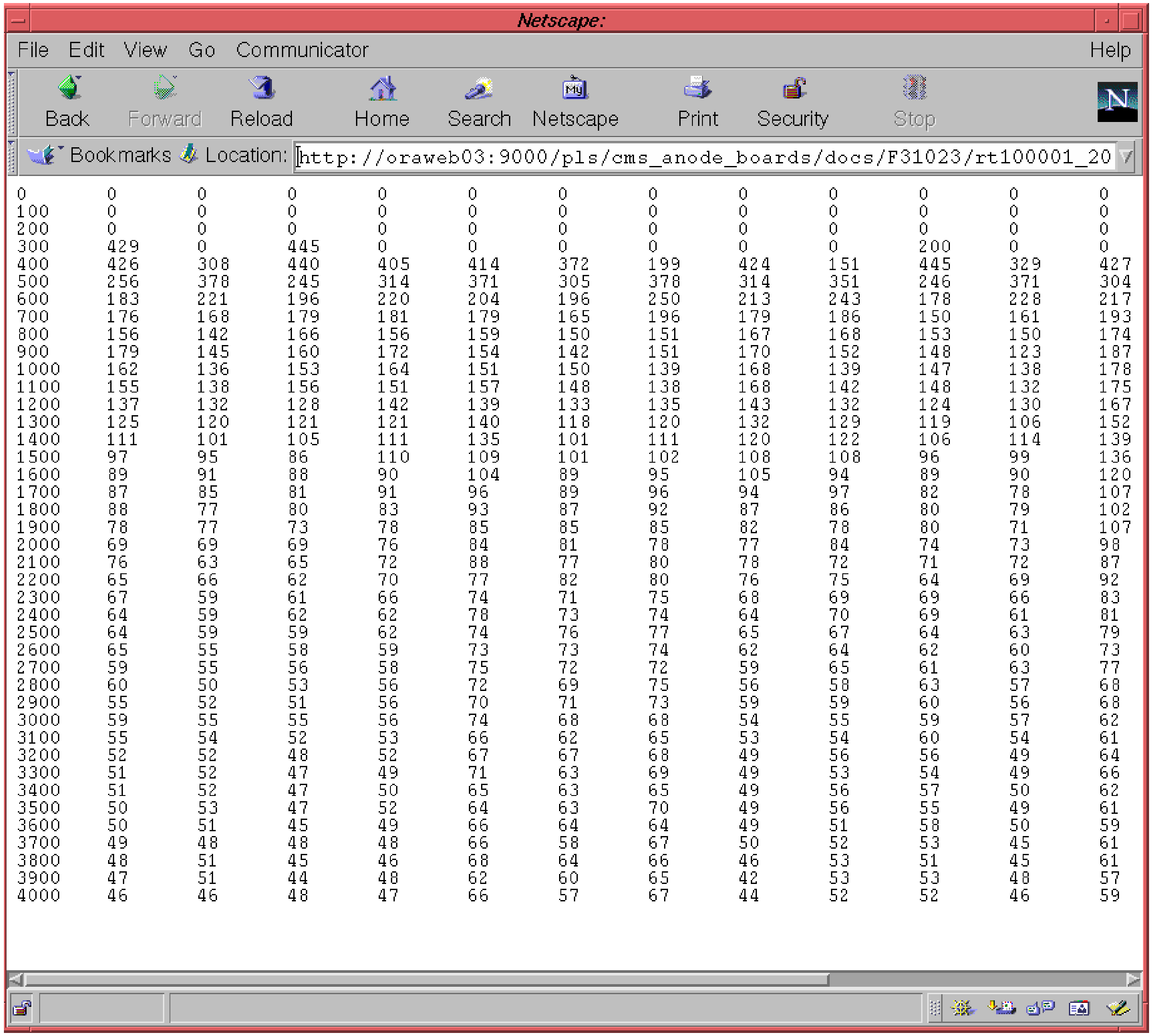
Board test results

File	Size	Type	Date of file	Board	Run
F20438/mt100001_20002.out	772	text/plain	14–MAY–2001 17:02:41	20002	100001
F12618/rt100001_20002.out	564	text/plain	14–MAY–2001 17:03:58	20002	100001
F12948/th100001_20002.out	2145	text/plain	14–MAY–2001 17:15:04	20002	100001

Pictures

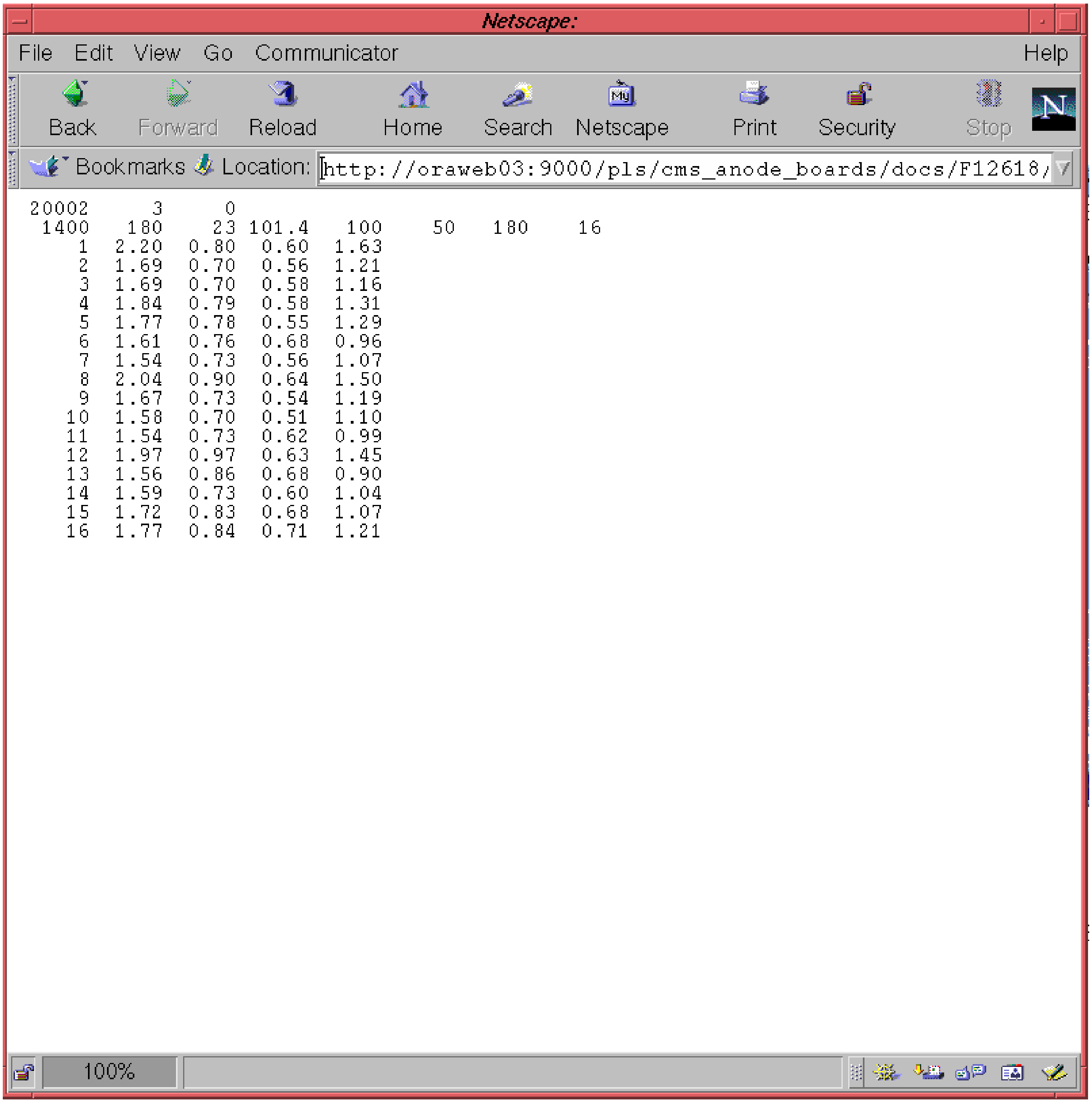
File	Size	Type	Date of file	Board	Run
F25338/rt100001_20002.ps.gz	30711	application/postscript	14–MAY–2001 17:28:11	20002	100001
F4713/th100001_20002.ps.gz	63640	application/postscript	14–MAY–2001 17:30:31	20002	100001

Netscape access



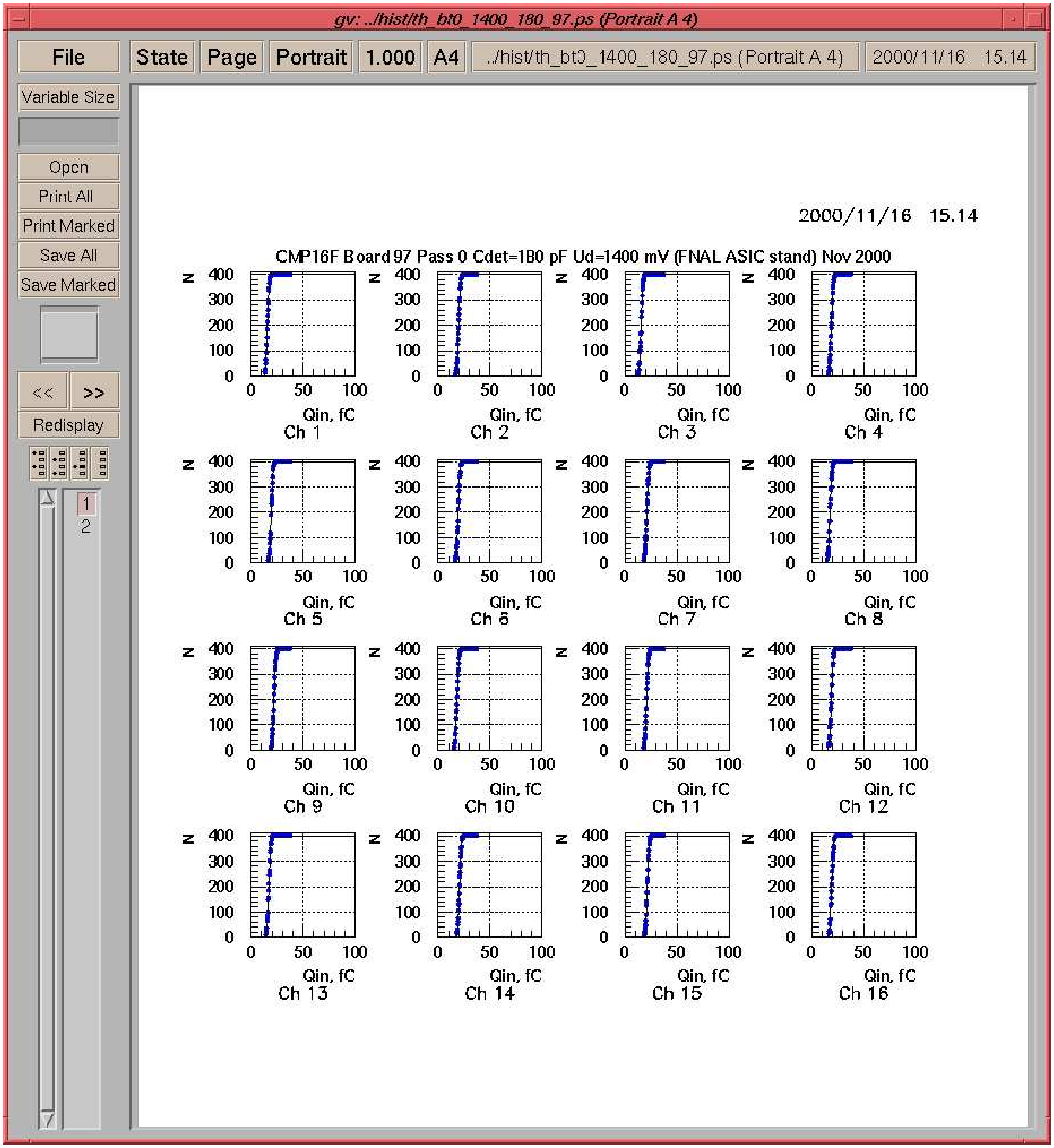
0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0	0
200	0	0	0	0	0	0	0	0	0	0	0	0	0
300	429	0	445	0	0	0	0	0	0	200	0	0	0
400	426	308	440	405	414	372	199	424	151	445	329	427	
500	256	378	245	314	371	305	378	314	351	246	371	304	
600	183	221	196	220	204	196	250	213	243	178	228	217	
700	176	168	179	181	179	165	196	179	186	150	161	193	
800	156	142	166	156	159	150	151	167	168	153	150	174	
900	179	145	160	172	154	142	151	170	152	148	123	187	
1000	162	136	153	164	151	150	139	168	139	147	138	178	
1100	155	138	156	151	157	148	138	168	142	148	132	175	
1200	137	132	128	142	139	133	135	143	132	124	130	167	
1300	125	120	121	121	140	118	120	132	129	119	106	152	
1400	111	101	105	111	135	101	111	120	122	106	114	139	
1500	97	95	86	110	109	101	102	108	108	96	99	136	
1600	89	91	88	90	104	89	95	105	94	89	90	120	
1700	87	85	81	91	96	89	96	94	97	82	78	107	
1800	88	77	80	83	93	87	92	87	86	80	79	102	
1900	78	77	73	78	85	85	85	82	78	80	71	107	
2000	69	69	69	76	84	81	78	77	84	74	73	98	
2100	76	63	65	72	88	77	80	78	72	71	72	87	
2200	65	66	62	70	77	82	80	76	75	64	69	92	
2300	67	59	61	66	74	71	75	68	69	69	66	83	
2400	64	59	62	62	78	73	74	64	70	69	61	81	
2500	64	59	59	62	74	76	77	65	67	64	63	79	
2600	65	55	58	59	73	73	74	62	64	62	60	73	
2700	59	55	56	58	75	72	72	59	65	61	63	77	
2800	60	50	53	56	72	69	75	56	58	63	57	68	
2900	55	52	51	56	70	71	73	59	59	60	56	68	
3000	59	55	55	56	74	68	68	54	55	59	57	62	
3100	55	54	52	53	66	62	65	53	54	60	54	61	
3200	52	52	48	52	67	67	68	49	56	56	49	64	
3300	51	52	47	49	71	63	69	49	53	54	49	66	
3400	51	52	47	50	65	63	65	49	56	57	50	62	
3500	50	53	47	52	64	63	70	49	56	55	49	61	
3600	50	51	45	49	66	64	64	49	51	58	50	59	
3700	49	48	48	48	66	58	67	50	52	53	45	61	
3800	48	51	45	46	68	64	66	46	53	51	45	61	
3900	47	51	44	48	62	60	65	42	53	53	48	57	
4000	46	46	48	47	66	57	67	44	52	52	46	59	

Netscape access



20002	3	0					
1400	180	23	101.4	100	50	180	16
1	2.20	0.80	0.60	1.63			
2	1.69	0.70	0.56	1.21			
3	1.69	0.70	0.58	1.16			
4	1.84	0.79	0.58	1.31			
5	1.77	0.78	0.55	1.29			
6	1.61	0.76	0.68	0.96			
7	1.54	0.73	0.56	1.07			
8	2.04	0.90	0.64	1.50			
9	1.67	0.73	0.54	1.19			
10	1.58	0.70	0.51	1.10			
11	1.54	0.73	0.62	0.99			
12	1.97	0.97	0.63	1.45			
13	1.56	0.86	0.68	0.90			
14	1.59	0.73	0.60	1.04			
15	1.72	0.83	0.68	1.07			
16	1.77	0.84	0.71	1.21			

Netscape access



Access from program

LWP - Library for WWW access in Perl.

```
$ua = new LWP::UserAgent;
$response = $ua→request(...URL...);
$response→content
```

JAVA - class URL to access URL-address

To upload files:

Server in C

$\Downarrow$

Calls Perl script

or

JAVA

Storing text files in Oracle

Files - universal and flexible mean to save information.

- *High portability.*
- *File is associated with necessary number of keys (easy searchable).*
- *Contains numbers of any kind and text.*
- *Accessible everywhere through internet (URL address).*
- *Can be viewed, saved on disk, printed.*
- *Can be decoded inside a program and numbers (and text) can be used for analysis.*

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