Mobile web client for PSI Elog

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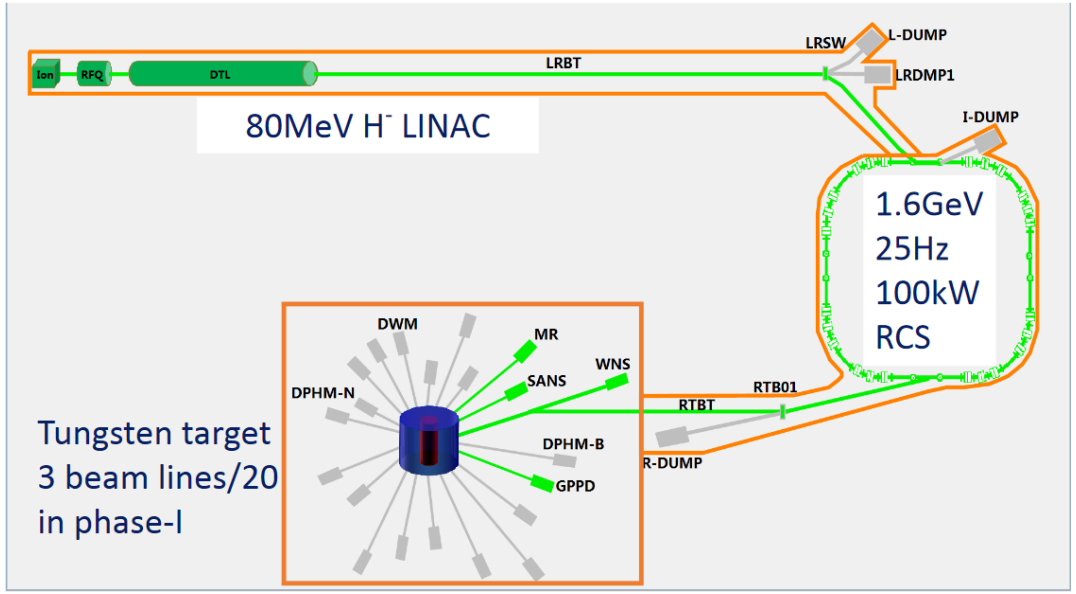
- （1）Scenario
- （2）Design
- （3）Read logs
- （4）User login
- （5）Write logs
- （6）Suggestion to PSI Elog

Scenario

- **CSNS passed the national inspection and acceptance on August 2018**
  - **Shifted from beam commissioning to reliable operation.**



The composition of CSNS Phase 1

Bird's eye view of CSNS campus taken in 2022

Scenario

- PSI Elog has been used at CSNS since 2016 and has stored more than 19000 logs.
- Links for PSI Elog
  - https://elog.psi.ch/elog/
  - https://github.com/paulscherrerinstitute/py_elog

Welcome to the CSNS Accelerator Electronic logbooks

Logbook	Entries	Last submission
Accelerator		
Shift	3296	2023.03.31 08:20 by [redacted]
Accelerator Physics	56	2021.10.31 19:01 by [redacted]
Control System	614	2023.03.31 12:13 by [redacted]
Front End	1269	2022.11.27 01:41 by [redacted]
Drift Tube Linac	1109	2023.03.13 09:59 by [redacted]
Linac RF	520	2022.12.12 15:29 by [redacted]
Ring RF	1827	2023.02.18 04:01 by [redacted]
Power Supply	1047	2023.03.30 21:28 by [redacted]
Magnet	0	-
Vacuum	155	2023.02.07 11:49 by [redacted]
Beam Instrumentation	2036	2023.03.31 12:29 by [redacted]
Mechanical Engineering	0	-
Survey Alignment	0	-
Radiation Safety	204	2023.03.27 13:04 by [redacted]
White Neutron Source	1090	2023.03.30 16:50 by [redacted]
Associated Proton Experimental Platform	23	2023.03.30 12:31 by [redacted]
ShiftCheck		
Accelerator Shift Check	4855	2023.03.31 12:17 by [redacted]
White Neutron Source Shift Check	589	2020.01.21 18:50 by [redacted]
Control System Shift Check	100	2021.12.13 15:04 by [redacted]
Vacuum Shift Check	195	2020.04.22 14:21 by [redacted]
Wishlist		
Wishlist	9	2016.11.29 19:22 by [redacted]

Home page

Scenario

Control System, Page 1 of 31 — Not logged in

Find | Login | Help

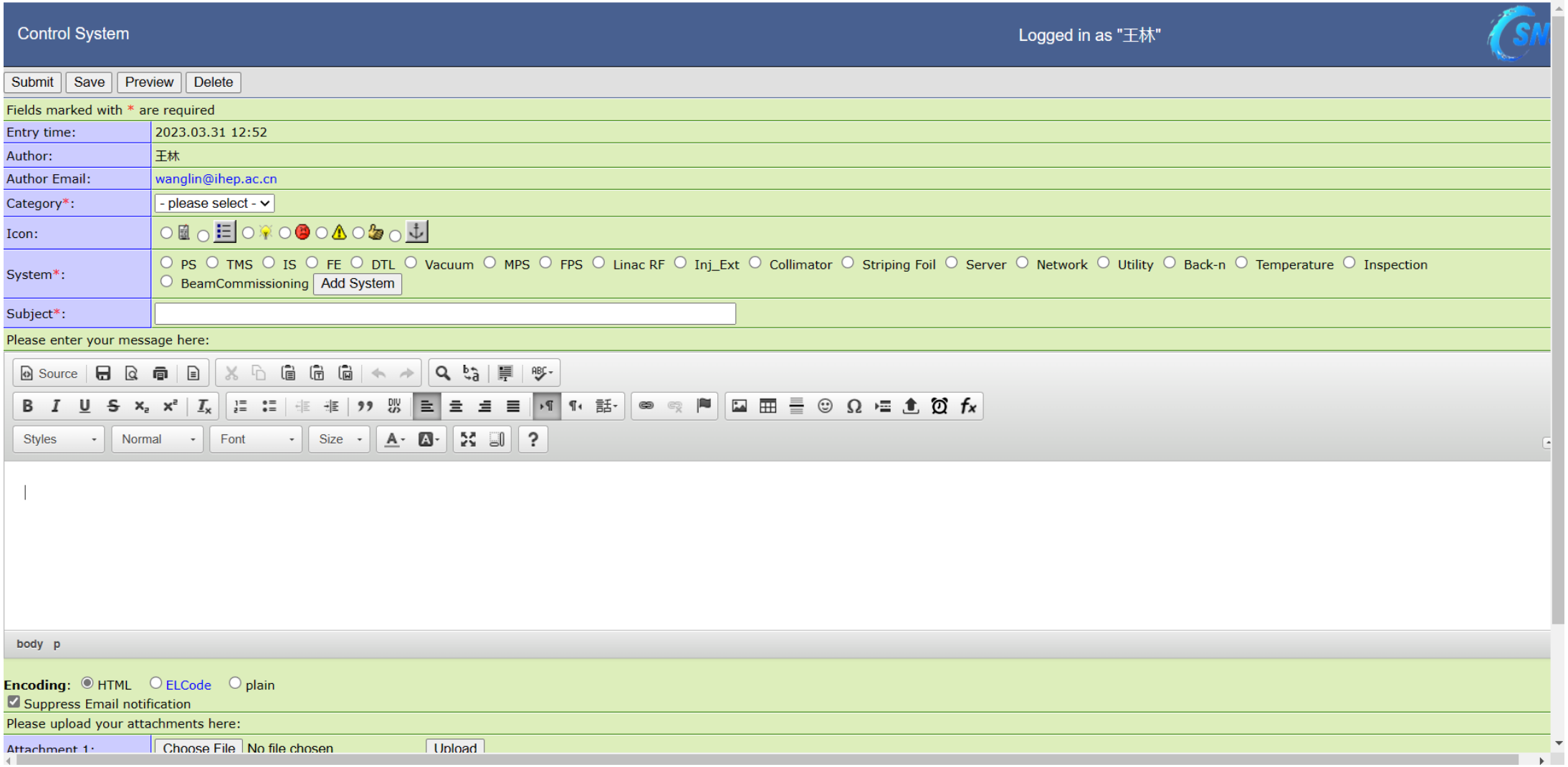
Full | Summary | Threaded — -- All entries -- | -- Author -- | -- System -- | -- Category -- | -- Subject -- | -- Text -- — 603 Entries

Goto page 1, 2, 3 ... 29, 30, 31 Next Goto

ID	Date	Author	Author Email	Category	Icon	System	Subject	Text
1089	2023.01.19 14:46	zhang yuliang	zhangyl@ihep.ac.cn	Maintenance		TMS	RCS…新	由于EVE的OTP信号改变时宽时，先禁止输出，然后再使能输出，这样会导致由源控制器内部锁存的是高信号丢失，二改为使用事件码触发修改时宽，修改如下：
1088	2022.11.14 14:24	[redacted]	[redacted]	Maintenance		Network	2/6/6端口	因11月8日计算中心反馈"收到一条控制网核心交换机的端口错误模块的信息，端口可能接触不良，可以尝试更换模块或跳线解决
1086	2022.10.17 15:01	[redacted]	[redacted]@ihep.ac.cn	Maintenance		PS	增加…和故障信息显示功能	除RCS…程复位和故障信息显示功能的添加
1085	2022.10.01 16:57	zhang yuliang	zhangyl@ihep.ac.cn	Manual		TMS	Edit: chopper定时信号说明	高频信号宽度约束：EVR2 OTP0，用来约束实际束流宽度，此前是chopper允许的最大束流宽度，目前设置位550us。
1083	2022.09.19 14:46	zhang yuliang	zhangyl@ihep.ac.cn	Maintenance		TMS	主定…线频率不同步	为了…选择使用内部晶振参考事件钟
1082	2022.09.19 14:45	zhang yuliang	zhangyl@ihep.ac.cn	Fault		TMS	[redacted]	主定时丢失一个25Hz脉冲。作为对照组的主定时测试站（使用EVR内部晶振）没有发现脉冲丢失。
1080	2022.08.24 11:20	[redacted]	[redacted]@ihep.ac.cn	Report		MPS	R…源…锁	暑期检修信申重启后，以上导获已自动取消
1078	2022.07.29 18:28	[redacted]	[redacted]@ihep.ac.cn	Report		DTL	R…DTL…源…锁	已在控制机箱端修正改调它的线路故障原因。

Logbook page

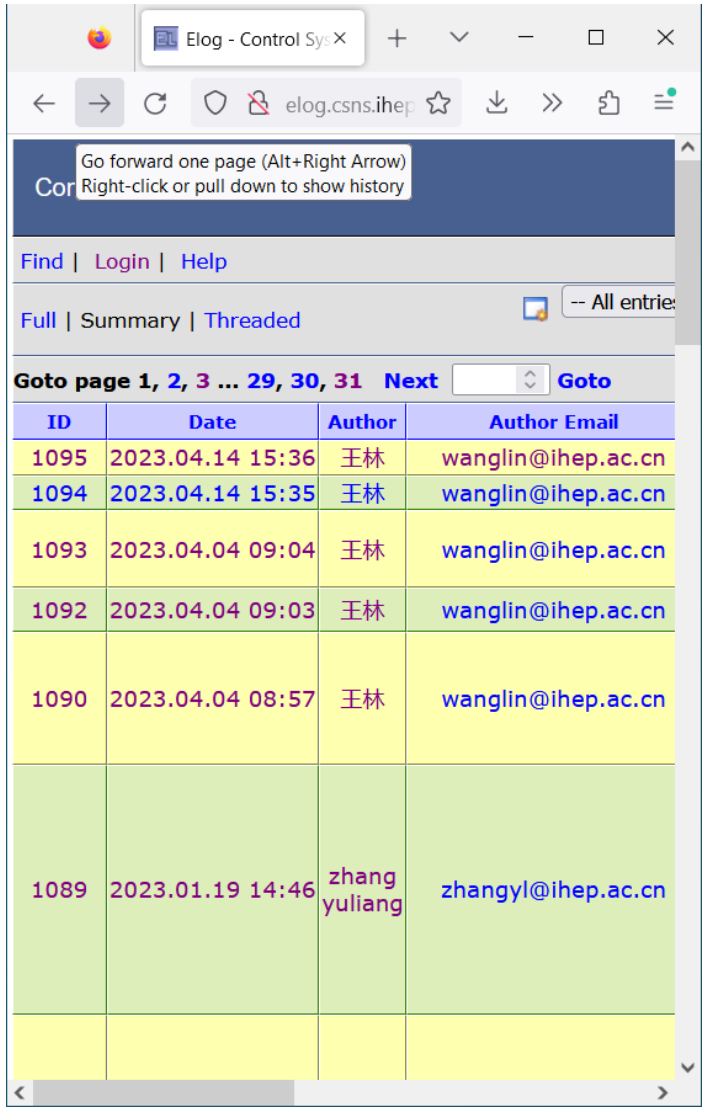
Scenario



Log creating page

Scenario

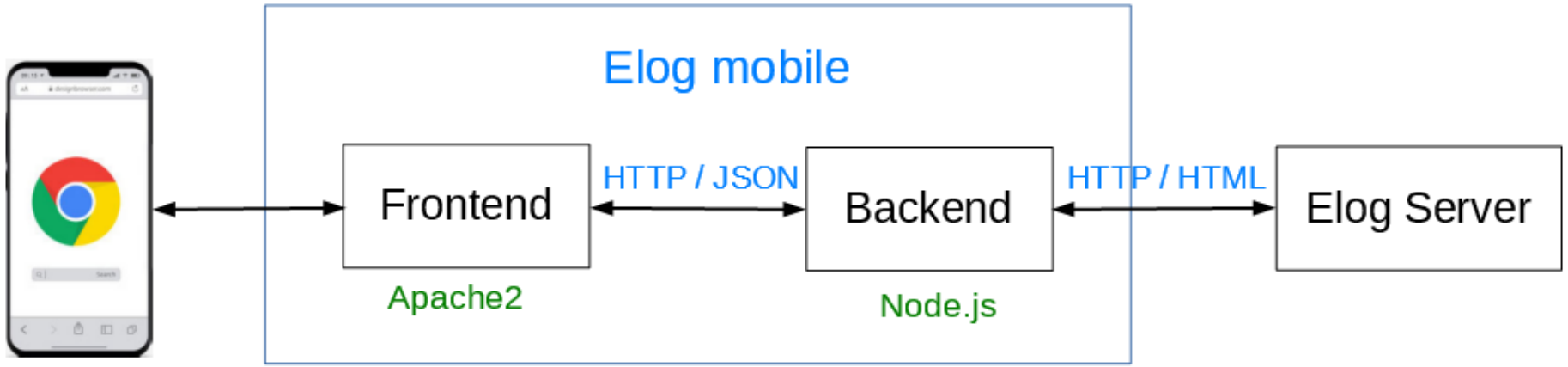
- Recent years, users at CSNS want to access Elog using smartphones.
- However, PSI Elog itself does not provide responsive or separate pages for small screen devices.
- Therefore, We decided to develop the mobile web client for PSI Elog.
- Note: different facilities may deploy PSI Elog with different customizations, so the mobile web pages developed at CSNS may not work for other facilities.
- This presentation is intended to describe the idea and implementation, which may be helpful to others.



Elog display in small browser window

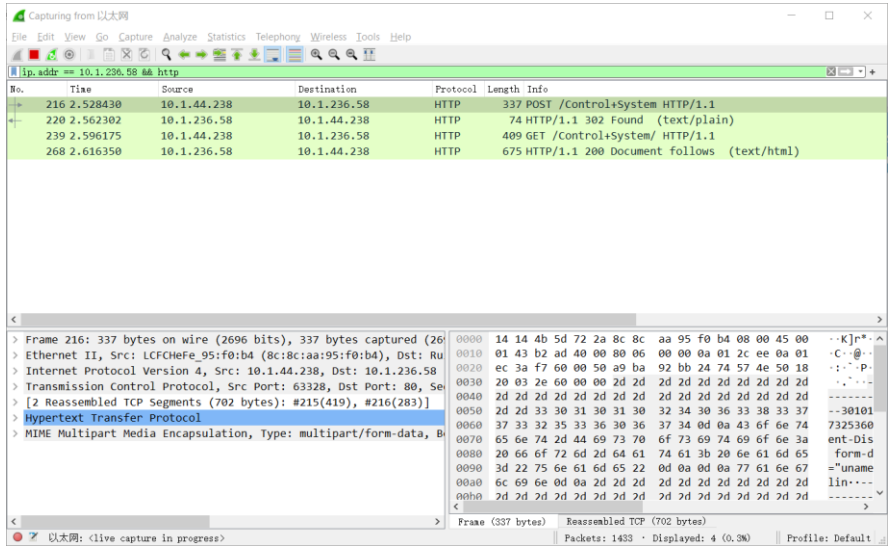
Design

- **Architecture**
  - Frontend: provides mobile web pages using Vue.js framework and PrimeVue component library.
  - Backend: accesses Elog server, parses and posts HTML data and provides a REST API using Node.js.
- **Why not just frontend**
  - Browsers' CORS (Cross-Origin Resource Sharing) mechanism prevents the frontend JavaScript from retrieving data from the Elog server.
  - Parsing HTML data within mobile backend can get better performance than within mobile frontend.

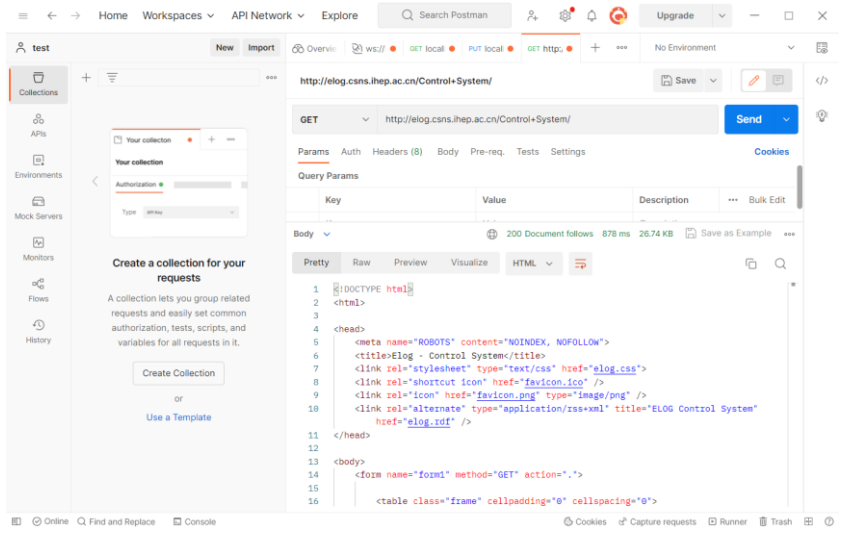


Architecture

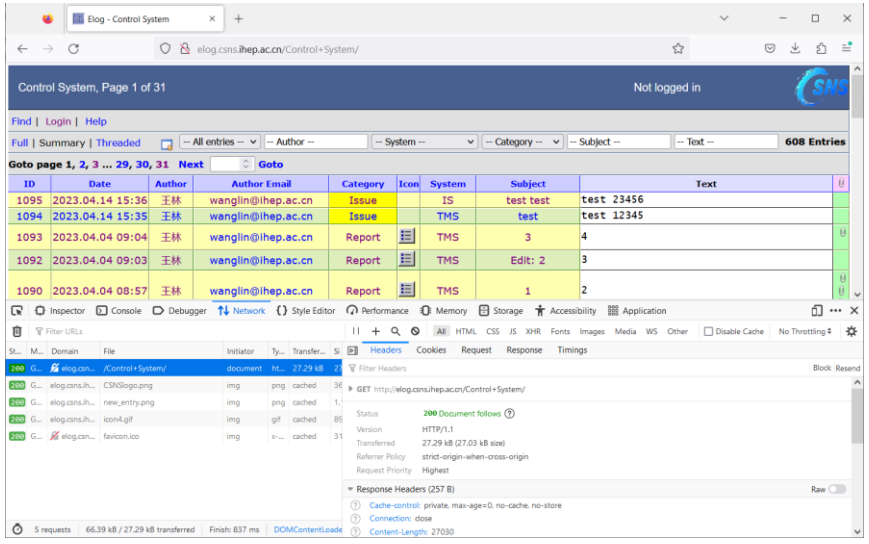
The HTTP communication mechanism of PSI Elog server is analysed using Wireshark, Postman, browser's F12 development tool and Elog python API.



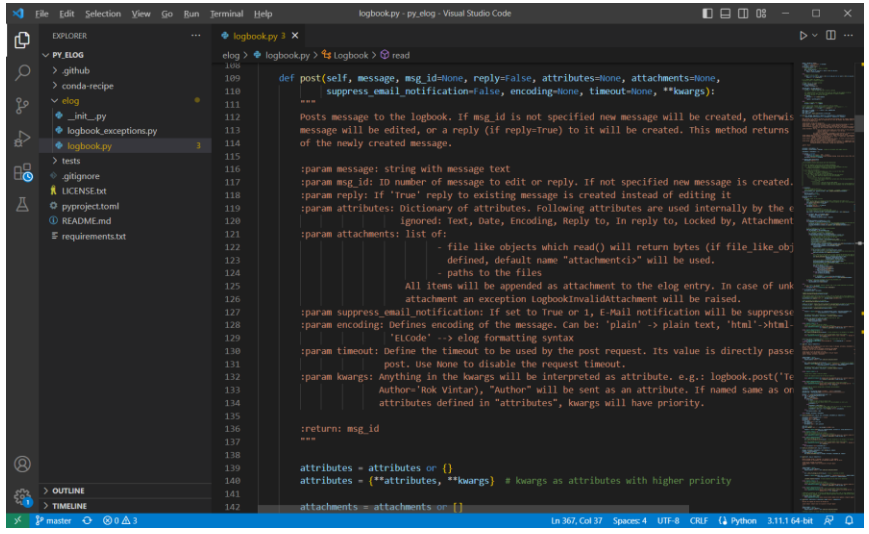
Wireshark



Postman



Browser dev tool



py_elog

Read logs

- Home page, logbook page and log page for mobile web client

Welcome to the CSNS Accelerator Electronic logbooks

Logbook	Entries	Last submission
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Power Supply	1047	2023.03.30 21:28 by [redacted]
Magnet	0	-
Vacuum	155	2023.02.07 11:49 by [redacted]
Beam Instrumentation	2036	2023.03.31 12:29 by [redacted]
Mechanical Engineering	0	-
Survey Alignment	0	-
Radiation Safety	204	2023.03.27 13:04 by [redacted]
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Wishlist		
Wishlist	9	2016.11.29 19:22 by [redacted]

Home page

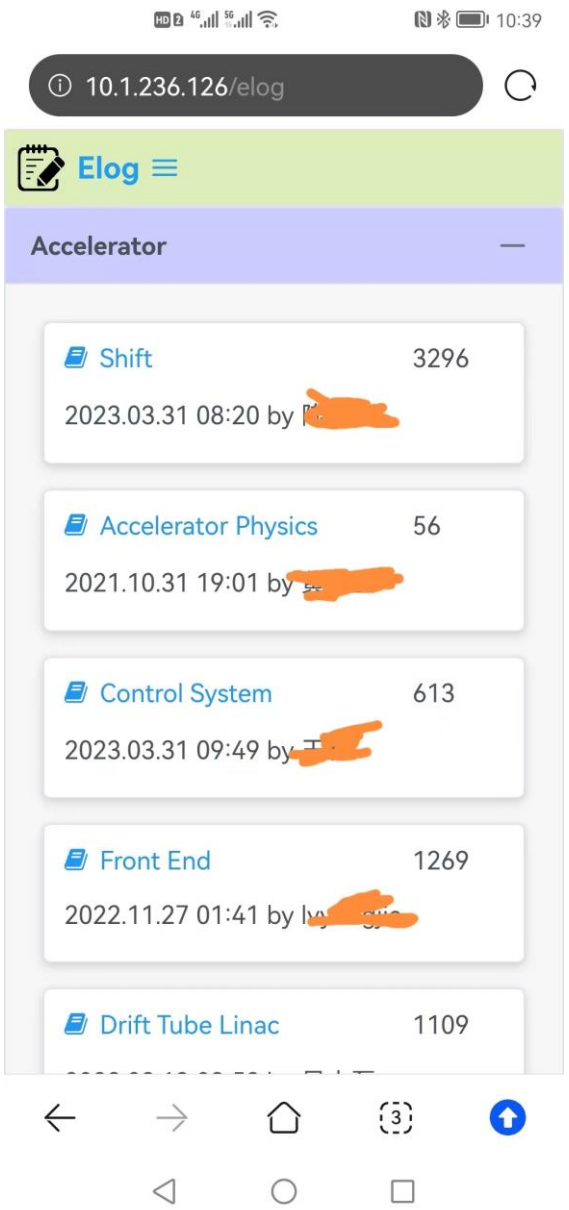
Read logs

- **Extract logbook info according to CSS class**
- **Logbook info**
  - Logbook group
  - Logbook name
  - Count of entries
  - Last submission
- **CSS class**
  - .selgroup
  - .sellogbook
  - .selentries
- **Server URL example**
  - http://elog.csns.ihep.ac.cn

```
<body>

    <table class="selframe" cellspacing=0 align=center>
        <tr>
            <td colspan=13 class="dlgtitle">
                <table border="0" cellpadding="0" width="100%">
                    <tr>
                        <td width="6%" bgcolor="#9DFF9D"><img align=left width=100 height=80 src="CSNSlogo.png"></td>
                        <td width="94%" valign="middle" bgcolor="#9DFF9D">
                            <center>
                                <font size=6><b>Welcome to the CSNS Accelerator Electronic logbooks</b></font>
                            </center>
                        </td>
                    </tr>
                </table>
            </td>
        </tr>
        <tr>
            <th colspan=10 class="seltitle">Logbook</th>
            <th class="seltitle">Entries</th>
            <th class="seltitle">Last submission</th>
        </tr>
        <tr>
            <td colspan=13 class="selgroup">Accelerator</td>
        </tr>
        <tr>
            <td class="selspace"> </td>
            <td colspan=9 class="sellogbook"><a href="Shift">Shift</a><br>
                <span class="selcomment"></span></td>
            <td nowrap class="selentries">3266</td>
            <td nowrap class="selentries">2023.03.16 08:18 by [redacted]</td>
        </tr>
        <tr>
            <td class="selspace"> </td>
            <td colspan=9 class="sellogbook"><a href="Accelerator+Physics">Accelerator Physics</a><br>
                <span class="selcomment"></span></td>
            <td nowrap class="selentries">56</td>
            <td nowrap class="selentries">2021.10.31 19:01 by [redacted]</td>
        </tr>
        <tr>
            <td class="selspace"> </td>
            <td colspan=9 class="sellogbook"><a href="Control+System">Control System</a><br>
```

HTML for home page

Read logs



Mobile home page

Read logs

Control System, Page 1 of 31 — Logged in as "王林"

New | Find | List | Last day | Config | Change password | Logout | Help

Full | Summary | Threaded — -- All entries -- | -- Author -- | -- System -- | -- Category -- | -- Subject -- | -- Text -- — 619 Entries

Goto page 1, 2, 3 ... 29, 30, 31 Next Goto

ID	Date	Author	Author Email	Category	Icon	System	Subject	Text	@
1118	2023.03.31 12:50	王林	wanglin@ihep.ac.cn	Reply		TMS	111111111111	2222222222222	
1117	2023.03.31 12:50	王林	wanglin@ihep.ac.cn	Reply		TMS	77777777777	888888888888	
1116	2023.03.31 12:50	王林	wanglin@ihep.ac.cn	Report		TMS	5555555555555555	666666666666666666	
1115	2023.03.31 12:49	王林	wanglin@ihep.ac.cn	Report		TMS	333333333333	444444444444444	
1114	2023.03.31 12:49	王林	wanglin@ihep.ac.cn	Report		TMS	1111111111111	2222222222222222	
1113	2023.03.31 12:13	王林	wanglin@ihep.ac.cn	Report		DTL	Elog mobile web client test	test 1234567890	@
1112	2023.03.31 09:49	王林	wanglin@ihep.ac.cn	Reply		IS	e	f	@ @
1111	2023.03.31 09:47	王林	wanglin@ihep.ac.cn	Reply		IS	qqq	www	@ @ @
1110	2023.03.31 09:44	王林	wanglin@ihep.ac.cn	Parameter		IS	1234567	67890	@ @
1109	2023.03.31 07:17	王林	wanglin@ihep.ac.cn	Report		TMS	11	22	@ @
1106	2023.03.28 15:02	王林	wanglin@ihep.ac.cn	Reply		TMS	111	222	@ @
1104	2023.03.28 14:35	王林	wanglin@ihep.ac.cn	Report		TMS	111	222	@
1103	2023.03.28 12:33	王林	wanglin@ihep.ac.cn	Report		TMS	Edit: attachment	attachment test	@
1099	2023.03.26 06:19	王林	wanglin@ihep.ac.cn	Parameter		TMS	Edit: Edit: 附件测试	123	@ @
1098	2023.03.18 01:05	王林	wanglin@ihep.ac.cn	Parameter		TMS	Edit: Edit: 附件测试 2	222	@ @
1093	2023.03.18 00:40	王林	wanglin@ihep.ac.cn	Manual		PS	Edit: 测试112233	11223344	

Logbook page

Read logs

- Extract all log IDs in a logbook according to CSS class
- Download logs one by one
- CSS class
  - .list1
  - .list2
  - .listdraft
- Server URL example
  - http://elog.csns.ihep.ac.cn/Control+System

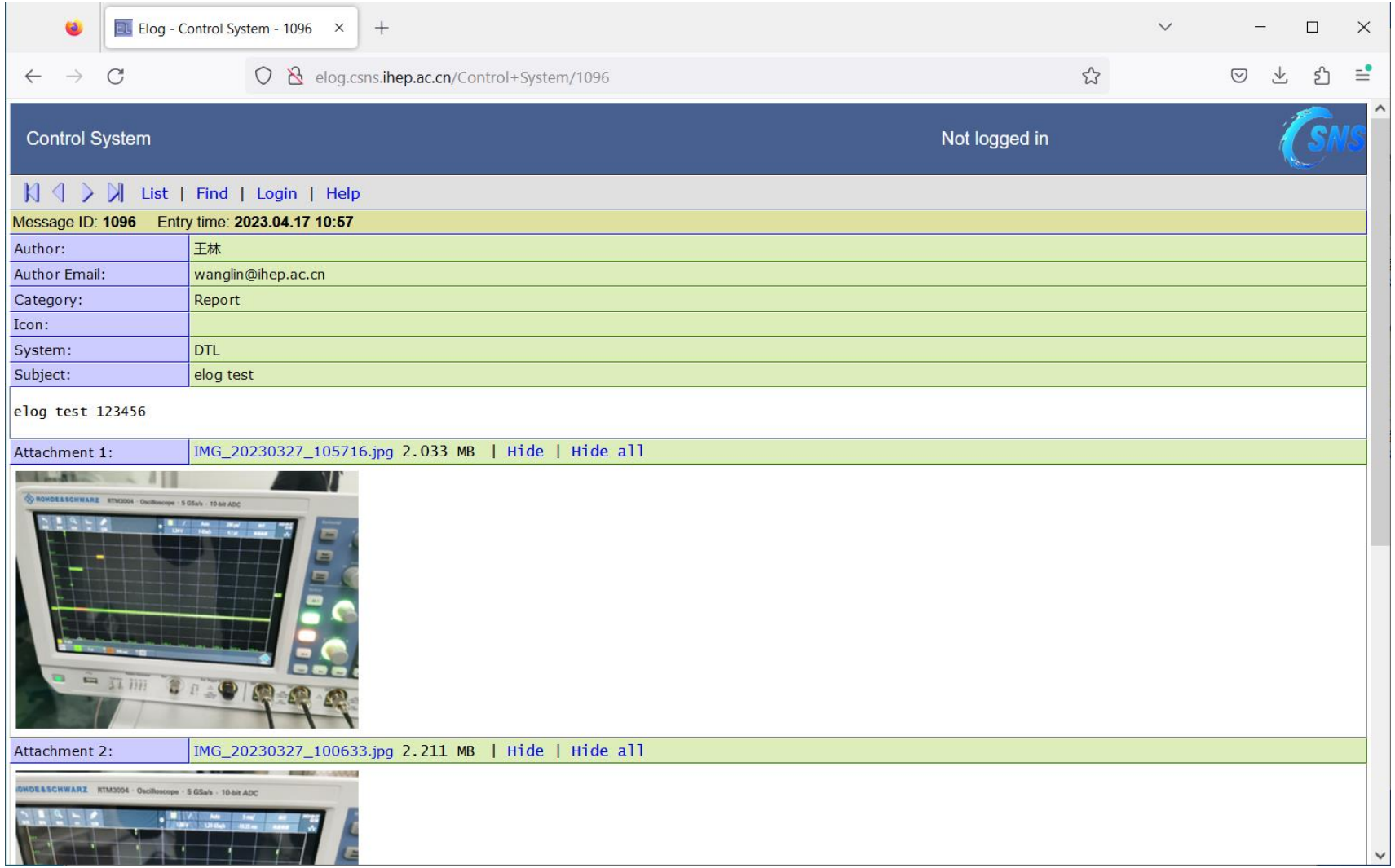
```
    <td class="list2">
        <a href="../Control+System/1095">  1095  </a>
    </td>

    <td class="list2" nowrap><a href="../Control+System/1095">2023.04.14 15:36</a></td>
    <td class="list2"><a href="../Control+System/1095">王林</a></td>
    <td class="list2"><a href="../Control+System/1095">wanglin@ihep.ac.cn</a></td>
    <td class="list2" style="background-color:yellow"><a href="../Control+System/1095">Issue</a>
    </td>
    <td class="list2"> </td>
    <td class="list2"><a href="../Control+System/1095">IS</a></td>
    <td class="list2"><a href="../Control+System/1095">test test</a></td>
    <td class="summary">test 23456</td>
    <td class="listatt">  </td>
<tr>
    <td class="list1">
        <a href="../Control+System/1094">  1094  </a>
    </td>

    <td class="list1" nowrap><a href="../Control+System/1094">2023.04.14 15:35</a></td>
    <td class="list1"><a href="../Control+System/1094">王林</a></td>
    <td class="list1"><a href="../Control+System/1094">wanglin@ihep.ac.cn</a></td>
    <td class="list1" style="background-color:yellow"><a href="../Control+System/1094">Issue</a>
    </td>
    <td class="list1"> </td>
    <td class="list1"><a href="../Control+System/1094">TMS</a></td>
    <td class="list1"><a href="../Control+System/1094">test</a></td>
    <td class="summary">test 12345</td>
    <td class="listatt">  </td>
<tr>
    <td class="list2">
        <a href="../Control+System/1093">  1093  </a>
    </td>

    <td class="list2" nowrap><a href="../Control+System/1093">2023.04.04 09:04</a></td>
    <td class="list2"><a href="../Control+System/1093">王林</a></td>
    <td class="list2"><a href="../Control+System/1093"><a
            href="mailto:wanglin@ihep.ac.cn">wanglin@ihep.ac.cn</a></a></td>
    <td class="list2"><a href="../Control+System/1093">Report</a></td>
    <td class="list2">
```

HTML for logbook page

Read logs

Mobile logbook page

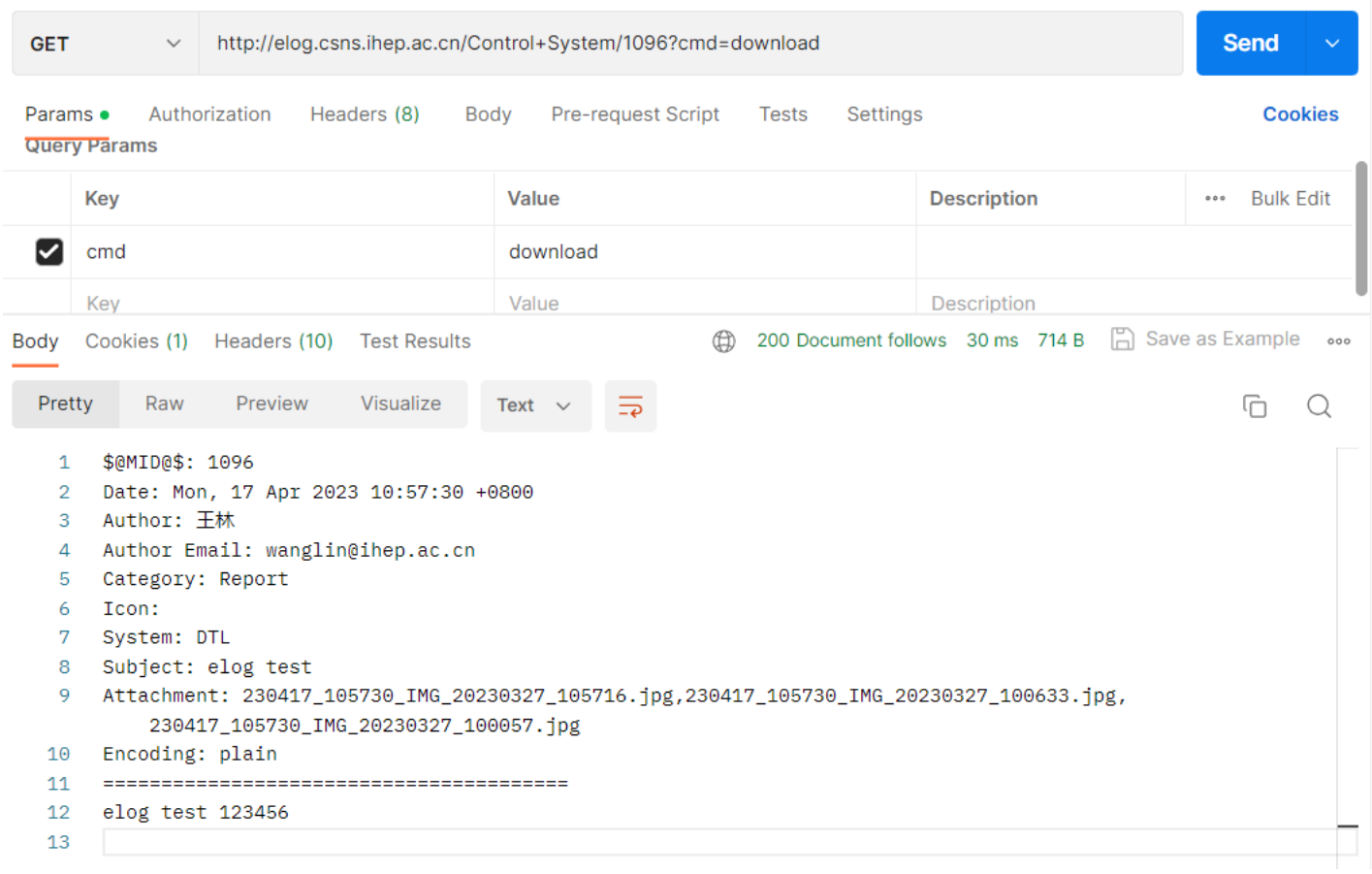
Read logs



Log page

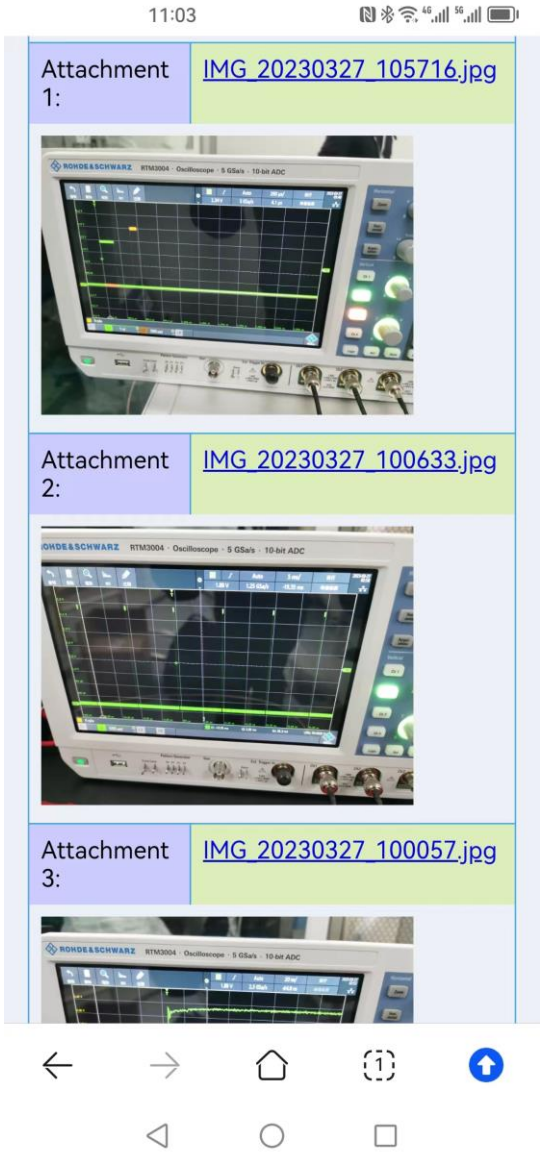
Read logs

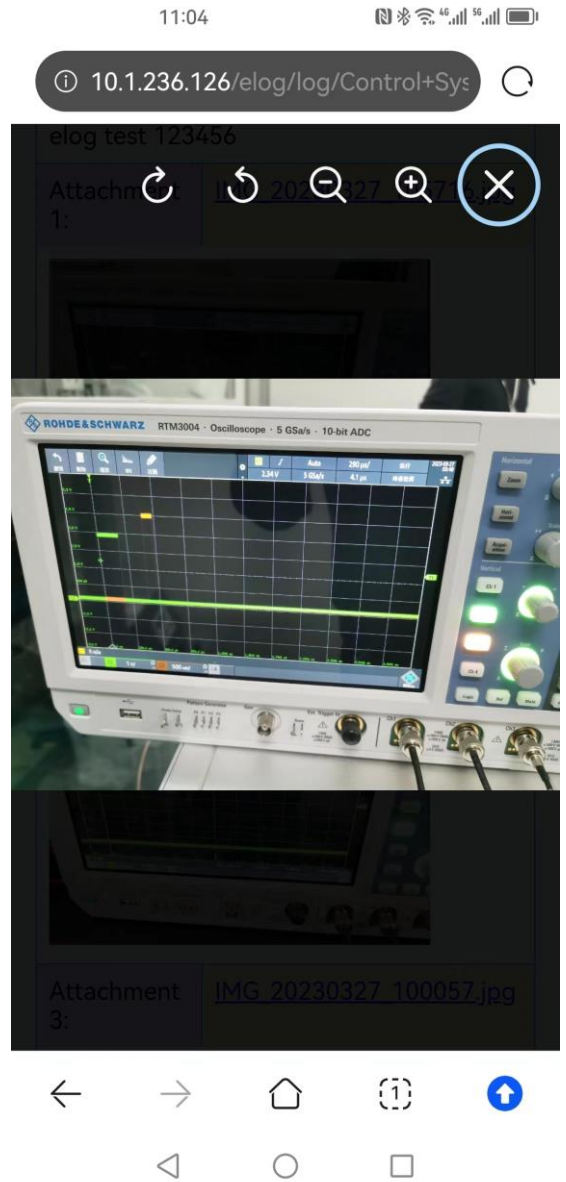
- Extract log info from log text
- Log info
  - MID
  - Date
  - Author
  - Author Email
  - Category
  - System
  - Subject
  - Content
  - Attachments
- Server URL example
  - http://elog.csns.ihep.ac.cn/Control+System/1096?cmd=download
  - http://elog.csns.ihep.ac.cn/Control+System/221001_165651/chopper.PNG



Log text

Read logs



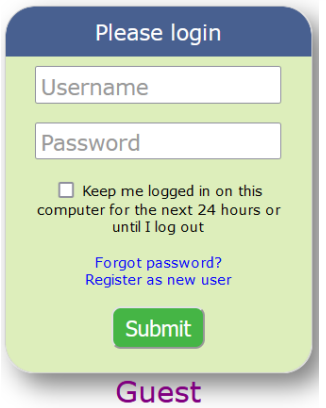


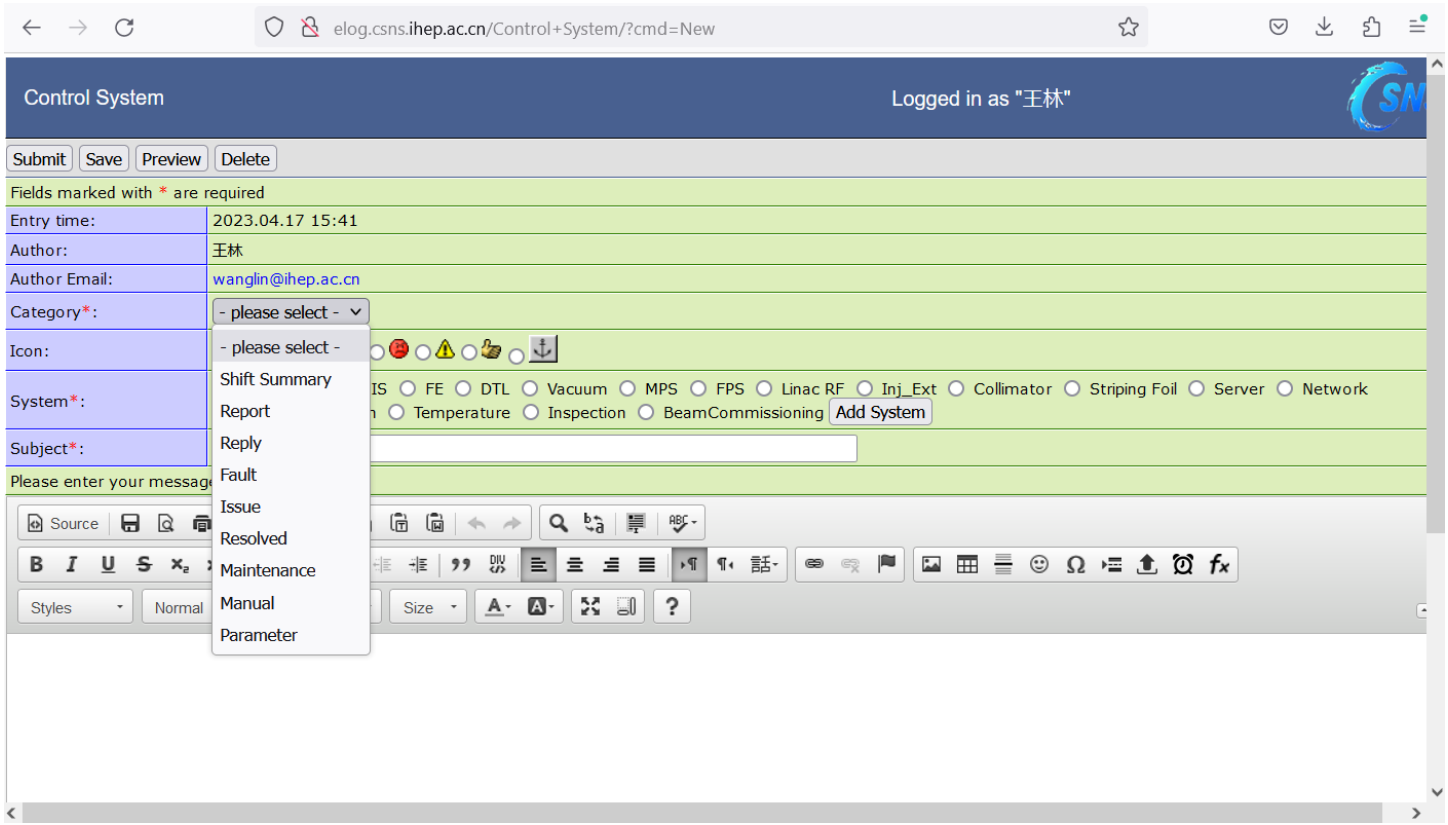
Mobile log page

User login

- **Purposes**
  - Authenticate user
  - Login from Node.js using session ID
  - Extract log field options
    - Category*
    - System*
  - Extract user info
    - Username
    - PasswordHash
    - Email
    - DisplayName

User authentication page

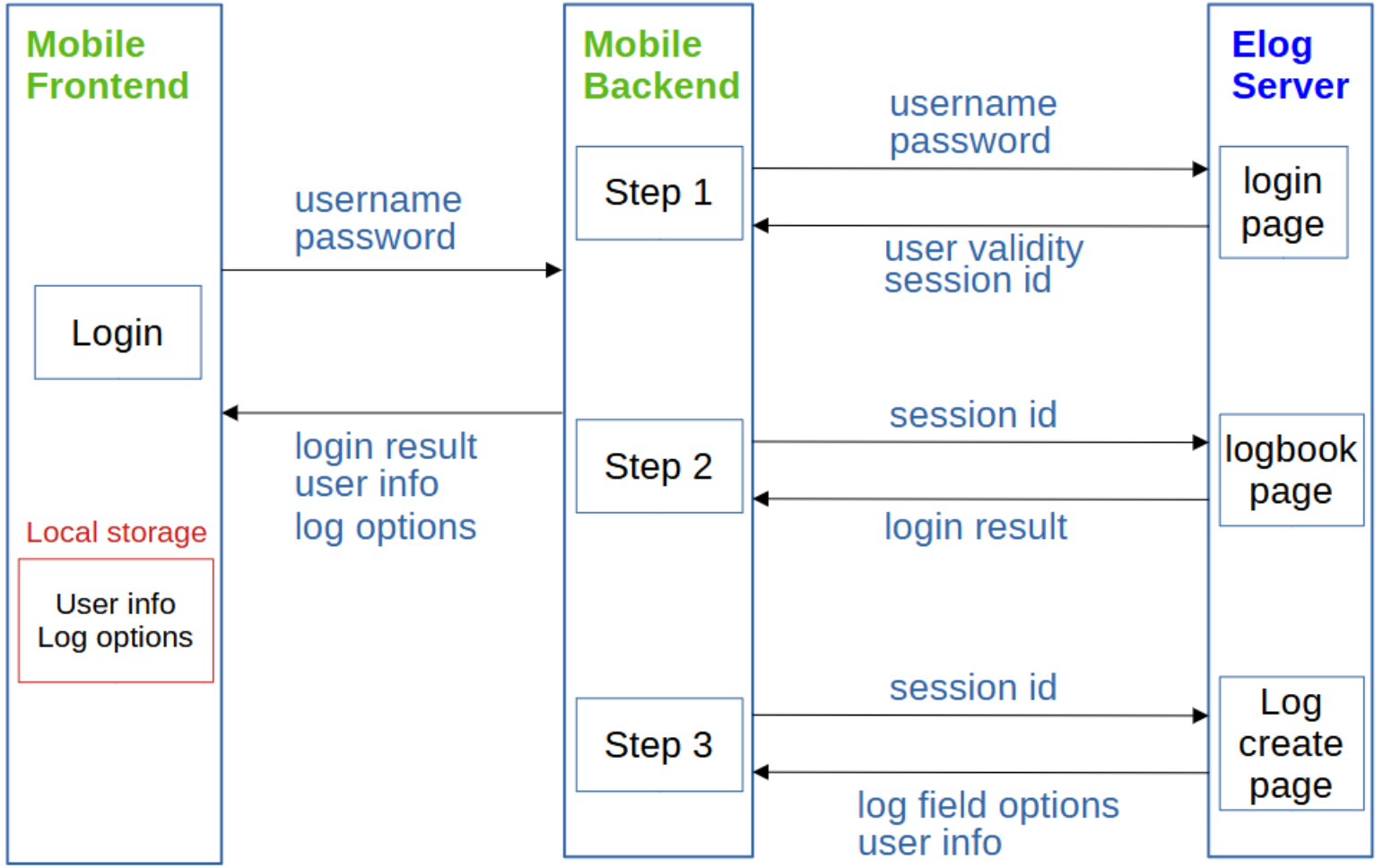




Field options

User login

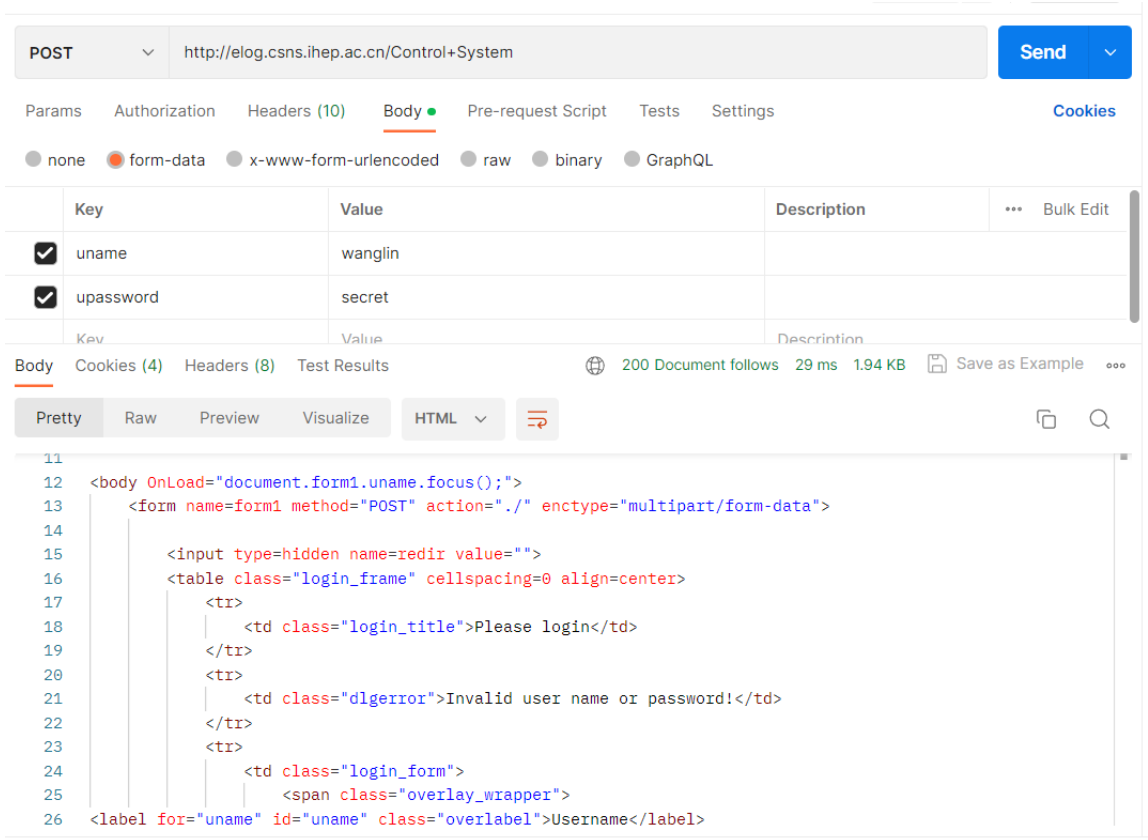
- **Login steps in backend**
  - Step1: Authenticate user and return session id
  - Step2: Use the session id to double check login status
  - Step3: Use the session id to open log creating page and extract log field options and user info
  - **On success, log field options and user info are stored in browser local storage**
- **Server URL example**
  - **http://elog.csns.ihep.ac.cn/Control+System**



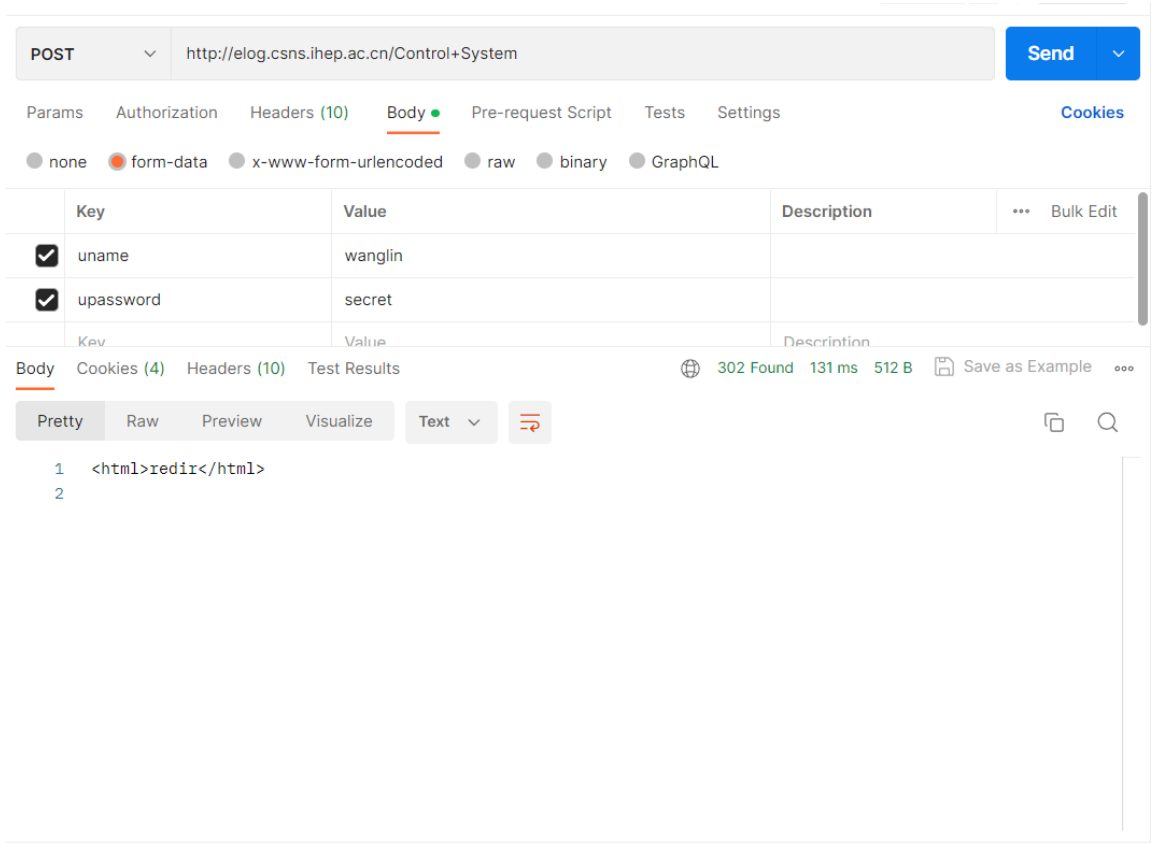
Login steps

User login

- **Login status**
  - Elog server returns “Invalid user name or password!” HTTP 200 on failure
  - Elog server returns “redir” HTTP 302 on success



Login failure



Login success

User login

- **Password hash**
  - Elog server uses "SHA256-based Unix crypt implementation"
  - Python passlib library can generate the same result
  - Elog mobile client uses unixcrypt package which perfectly works
  - **PasswordHash will be stored in browser local storage and send to Elog server for log write operations in future.**

crypt.cxx

```
/* SHA256-based Unix crypt implementation.
   Released into the Public Domain by Ulrich Drepper <drepper@redhat.com>.
   Adapted for MS Windows by Stefan Ritt <stefan.ritt@psi.ch>

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GNU General Public License for more details.

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```
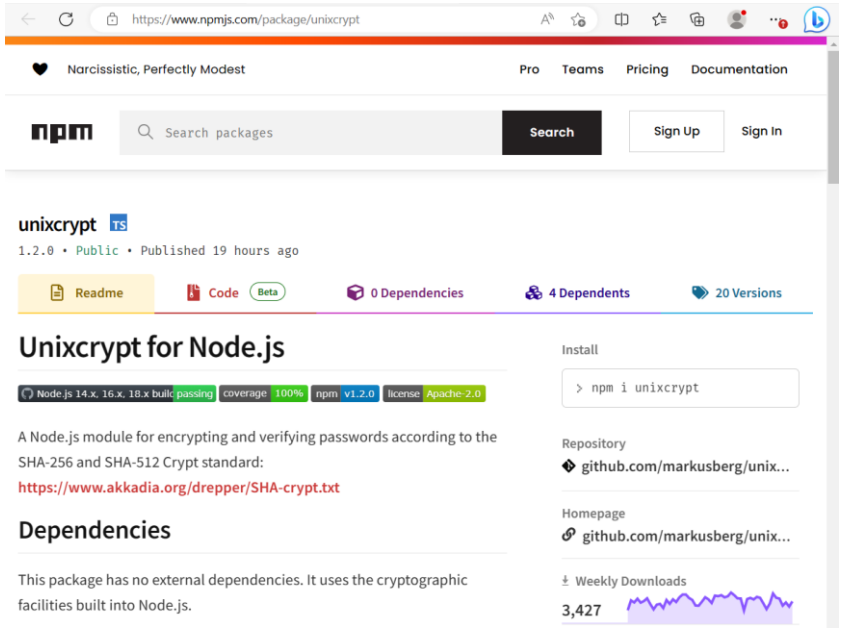

Elog crypt



unixcrypt package

logbook.py 3

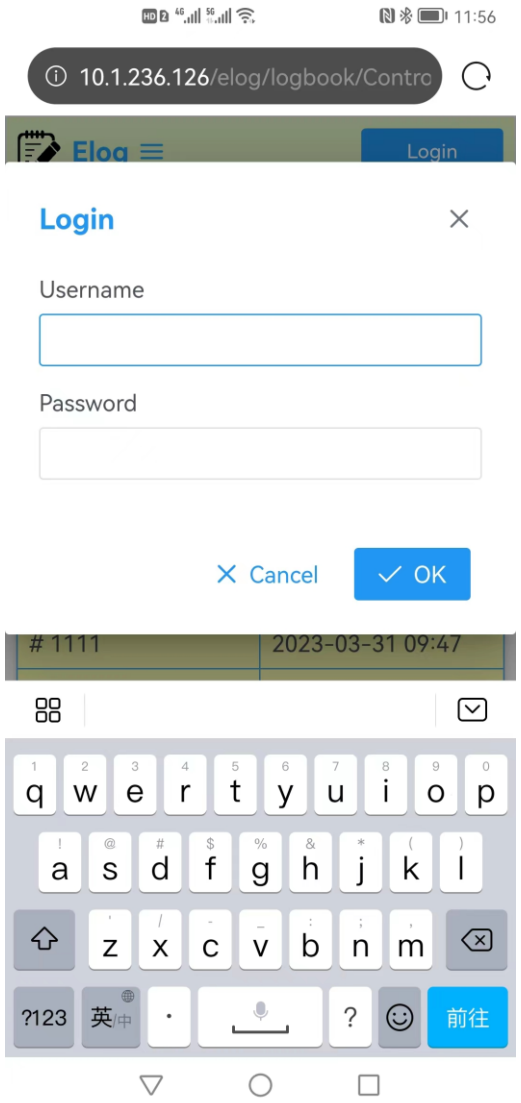
elog > logbook.py > _validate_response

passlib

```
def _handle_pswd(password, encrypt=True):
    """
    Takes password string and returns password as needed by elog. If encrypt=True then password will be
    sha256 encrypted (salt='', rounds=5000). Before returning password, any trailing $5$$ will be removed
    independent off encrypt flag.

    :param password: password string
    :param encrypt: encrypt password?
    :return: elog prepared password
    """
    if encrypt and password is not None:
        from passlib.hash import sha256_crypt
        return sha256_crypt.using(salt='', rounds=5000).hash(password)[4:]
    elif password and password.startswith('$5$$'):
        return password[4:]
    else:
        return password
```

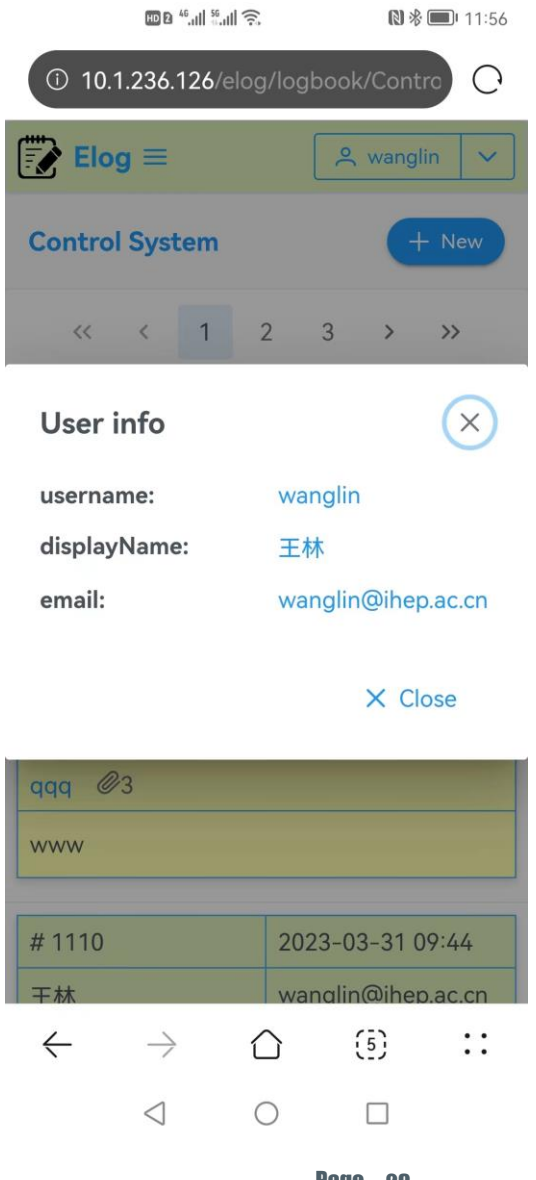
py_elog crypt

User login


11:56
10.1.236.126/elog/logbook/Contro
Elog
Login
Login
Username
Password
Cancel
OK
1111
2023-03-31 09:47

11:56
10.1.236.126/elog/logbook/Contro
Elog
wanglin
Success
Logged in
Control System
New
1 2 3
1112
2023-03-31 09:49
王林
wanglin@ihep.ac.cn
e
2
f
1111
2023-03-31 09:47
王林
wanglin@ihep.ac.cn
qqq
3
www
1110
2023-03-31 09:44

11:56
10.1.236.126/elog/logbook/Contro
Elog
wanglin
User info
Logout
Control System
1 2 3
1112
2023-03-31 09:49
王林
wanglin@ihep.ac.cn
e
2
f
1111
2023-03-31 09:47
王林
wanglin@ihep.ac.cn
qqq
3
www
1110
2023-03-31 09:44


11:56
10.1.236.126/elog/logbook/Contro
Elog
wanglin
Control System
New
1 2 3
User info
username:
wanglin
displayName:
王林
email:
wanglin@ihep.ac.cn
Close
qqq
3
www
1110
2023-03-31 09:44

Write logs

- **Write operations**
  - Creating logs, editing logs, deleting logs
- **All write operations are submitted using HTTP POST method**
  - Content-Type: multipart/form-data
- **User credential**
  - Password hash is stored in local storage of the browser
  - Username and password hash will be included in the submitting form
- **Attachments**
  - Attachments are submitted in “attfile{N}” field
  - Existing attachments can be adjusted using “attachment{N}” field when editing a log
- **Server URL example**
  - http://elog.csns.ihep.ac.cn/Control+System

Write logs

- **Create logs**

Request headers

Request payload

```
1  -----------------------------397968149940473879293101996O5
2  Content-Disposition: form-data; name="Author"
3
4  王林
5  -----------------------------397968149940473879293101996O5
6  Content-Disposition: form-data; name="Author_Email"
7
8  wanglin@ihep.ac.cn
9  -----------------------------397968149940473879293101996O5
10 Content-Disposition: form-data; name="Category"
11
12 Maintenance
13 -----------------------------397968149940473879293101996O5
14 Content-Disposition: form-data; name="System"
15
16 FPS
17 -----------------------------397968149940473879293101996O5
18 Content-Disposition: form-data; name="Subject"
19
20 111
21 -----------------------------397968149940473879293101996O5
22 Content-Disposition: form-data; name="Text"
23
24 222
25 -----------------------------397968149940473879293101996O5
26 Content-Disposition: form-data; name="cmd"
27
28 Submit
29 -----------------------------397968149940473879293101996O5
30 Content-Disposition: form-data; name="unm"
31
32 wanglin
33 -----------------------------397968149940473879293101996O5
34 Content-Disposition: form-data; name="upwd"
35
36 /RSGMJXl/t9D0IEfwL0X.8rM/bgw3qOFYNBH6xv8zJ1
37 -----------------------------397968149940473879293101996O5--
38
```

Request payload

Write logs

- **Edit logs**

Request headers

Request payload

```
1  ----------------------------170541488180934393973744550
2  Content-Disposition: form-data; name="edit_id"
3
4  1098
5  ----------------------------170541488180934393973744550
6  Content-Disposition: form-data; name="Author"
7
8  王林
9  ----------------------------170541488180934393973744550
10 Content-Disposition: form-data; name="Author_Email"
11
12 wanglin@ihep.ac.cn
13 ----------------------------170541488180934393973744550
14 Content-Disposition: form-data; name="Category"
15
16 Maintenance
17 ----------------------------170541488180934393973744550
18 Content-Disposition: form-data; name="System"
19
20 FPS
21 ----------------------------170541488180934393973744550
22 Content-Disposition: form-data; name="Subject"
23
24 111222
25 ----------------------------170541488180934393973744550
26 Content-Disposition: form-data; name="Text"
27
28 222333
29
30 ----------------------------170541488180934393973744550
31 Content-Disposition: form-data; name="cmd"
32
33 Submit
34 ----------------------------170541488180934393973744550
35 Content-Disposition: form-data; name="unm"
36
37 wanglin
38 ----------------------------170541488180934393973744550
39 Content-Disposition: form-data; name="upwd"
40
41 /RSGMJXl/t9D0IEfwL0X.8rM/bgw3qOFYNBH6xv8zJ1
42 ----------------------------170541488180934393973744550--
43
```

Request payload

Write logs

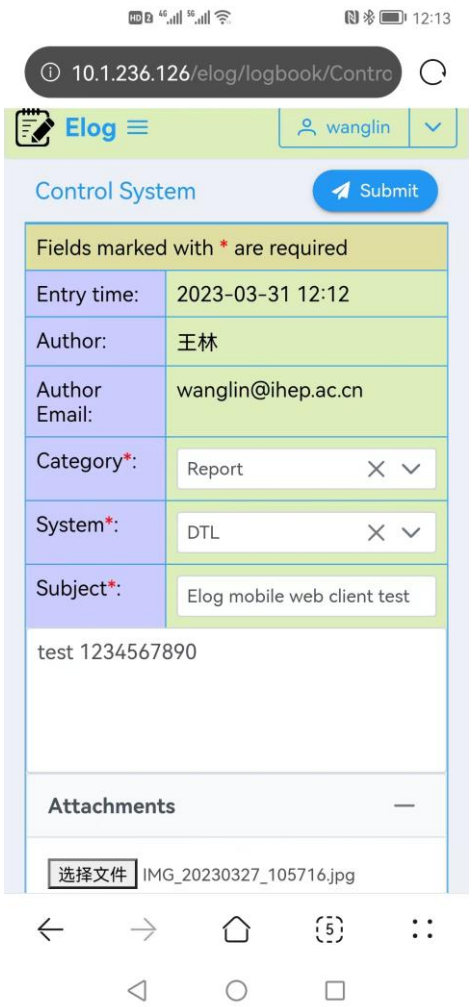
- **Delete logs**

Request headers

Request payload

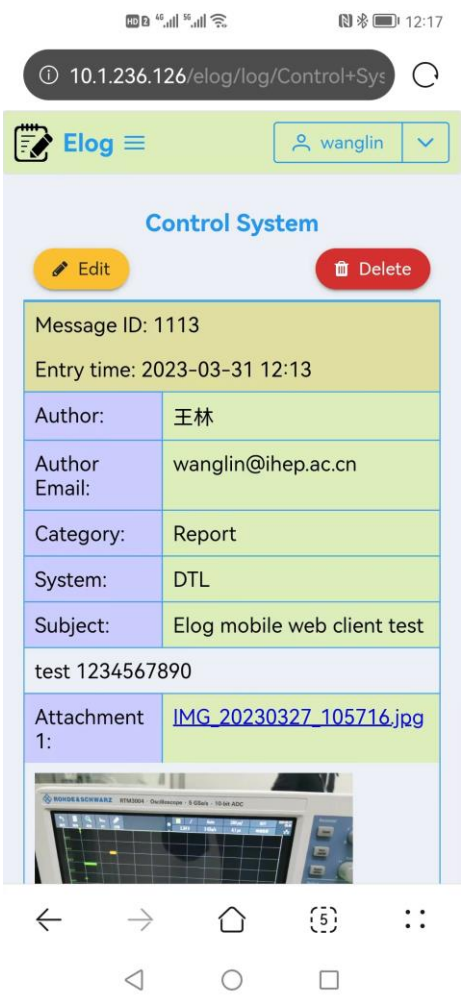
Write logs

Before creating

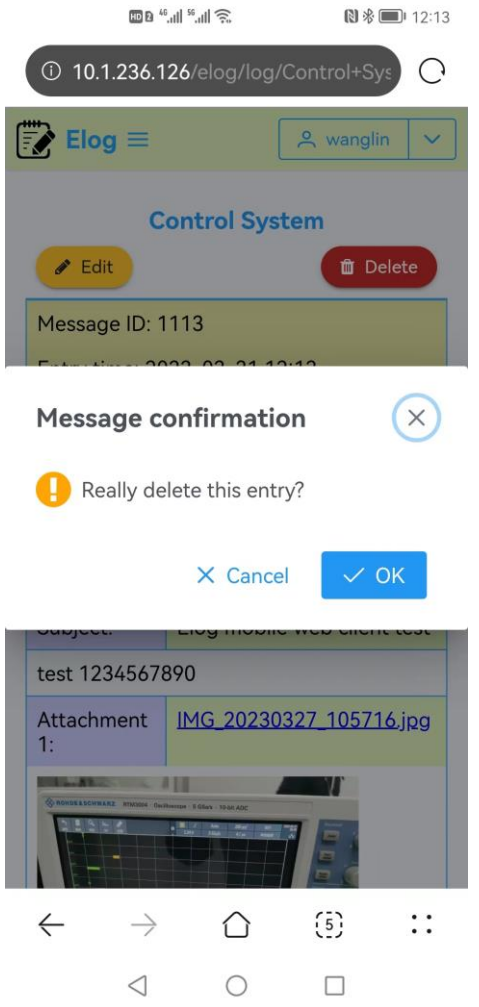


Creating new log

Log #1113 created



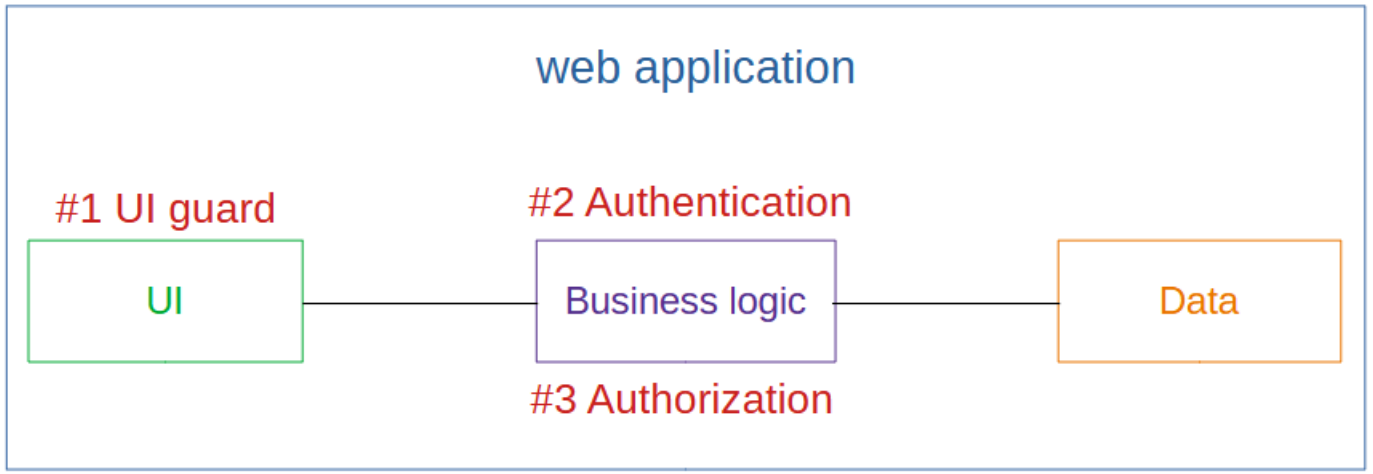
Reading Log #1113



Deleting Log #1113

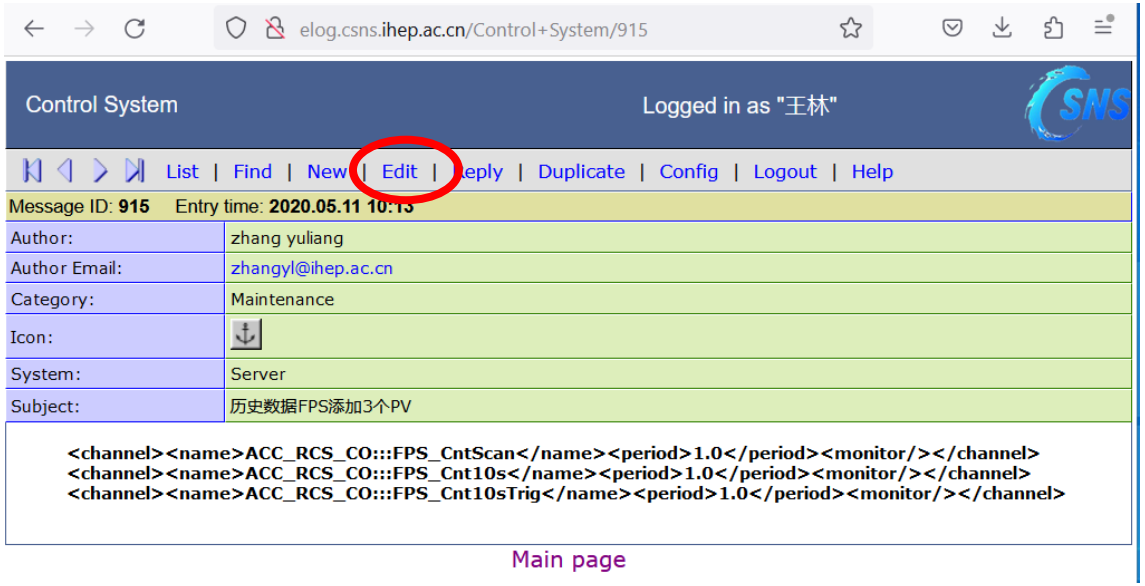
Suggestion to PSI Elog

- **Access control**
  - Prevent unauthorized operations
- **#1 UI guard**
  - Does not display unauthorized content
- **#2 Authentication**
  - Verify user credential
- **#3 Authorization**
  - Verify user permission, e.g. one user should not modify or delete data created by others

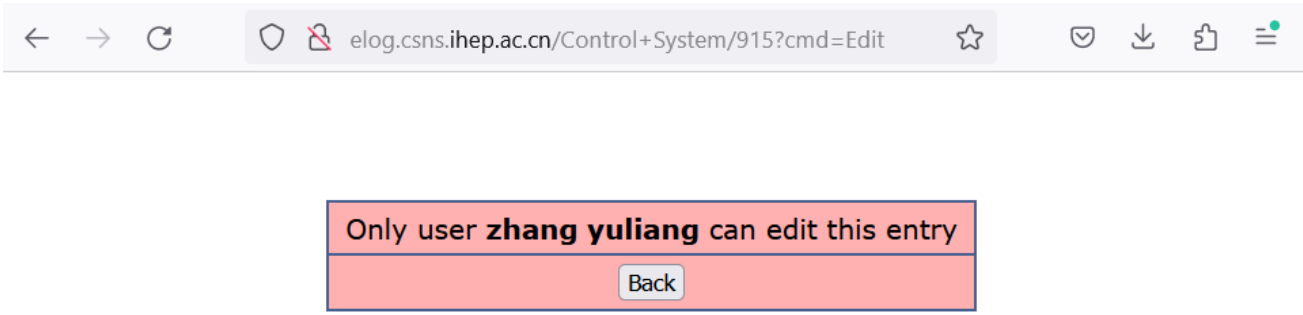


Access control in a web application

Suggestion to PSI Elog



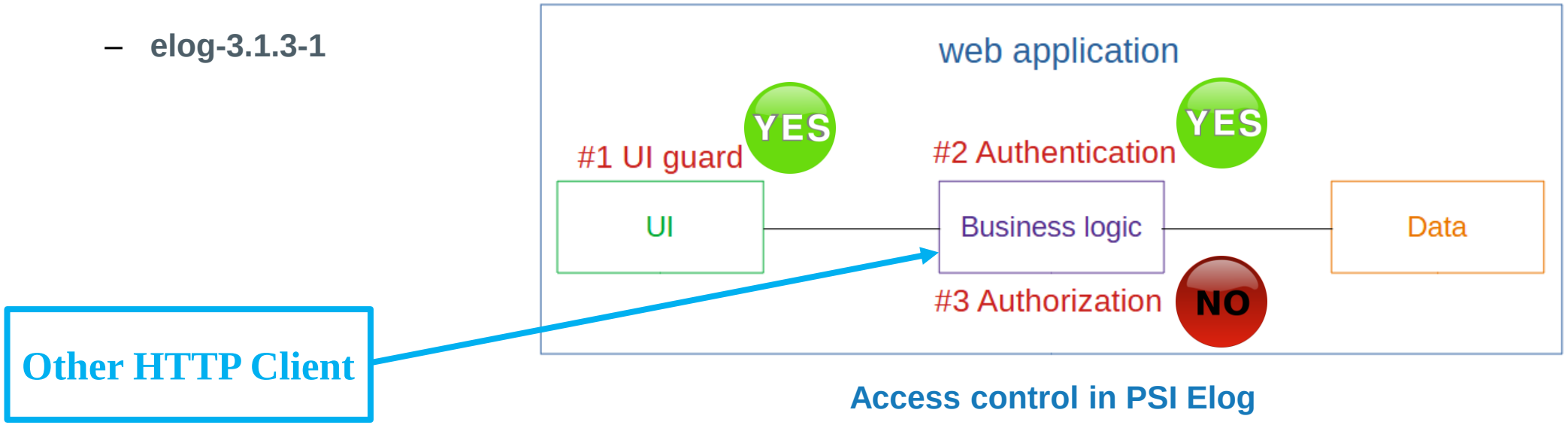
Trying to edit a log written by others



PSI Elog prohibit this operation from the web page

Suggestion to PSI Elog

- PSI Elog provides UI gurad.
- PSI Elog also provides authentication.
- However, PSI Elog does not provide authorization in business logic.
- I can send an HTTP POST request to delete logs written by other people using my user credential.
  This behavior was discovered when I was developing the mobile web client.
- Version at CSNS
  - elog-3.1.3-1



Access control in PSI Elog

Suggestion to PSI Elog

- **Example**
  - The following HTTP request can use my credential to delete the log with 1111 msgId written by another user
  - Content-Type multipart/form-data; boundary=--------------------------148345335060625759820789839 6

```
----------------------------148345335060625759820789839 6
Content-Disposition: form-data; name="edit_id"
1111
----------------------------148345335060625759820789839 6
Content-Disposition: form-data; name="jcmd"
XDelete
----------------------------148345335060625759820789839 6
Content-Disposition: form-data; name="cmd"
Delete
----------------------------148345335060625759820789839 6
Content-Disposition: form-data; name="unm"
wanglin
----------------------------148345335060625759820789839 6
Content-Disposition: form-data; name="upwd"
/RSGMJX1/t9DOIEfwLOX.8rM/bgw3qOFYNBH6xv8zJ1
----------------------------148345335060625759820789839 6--
```

- **Suggestion: Provide authorization for POST operations in business logic in Elog future versions.**

Summary

- The mobile web client is developed and deployed for the PSI Elog deployed at CSNS.
- It is implemented by parsing and submitting HTML format data.
- It may not work for PSI Elog deployed at other sites.
- The idea and implementation may be helpful to other sites.
- Link for mobile web client at CSNS
  - https://github.com/wanglin86769/elog-mobile
- Development team
  - Design & Implementation: Lin Wang wanglin@ihep.ac.cn
  - Line Manager: Yuliang Zhang zhangyl@ihep.ac.cn

Thanks for your attention!

CSNS campus photo taken in 2022