

API Testing

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Agenda



What is API / API Testing?

- **API (Application Programming Interface)** is a computing interface which enables communication and data exchange between two separate software systems.
- **API Testing** is a software testing type that validates Application Programming Interfaces (APIs).

Advantages (benefits) of API Testing

Why?

When?

Early testing

Easy test development and maintenance

Quick results and resolution

Why?

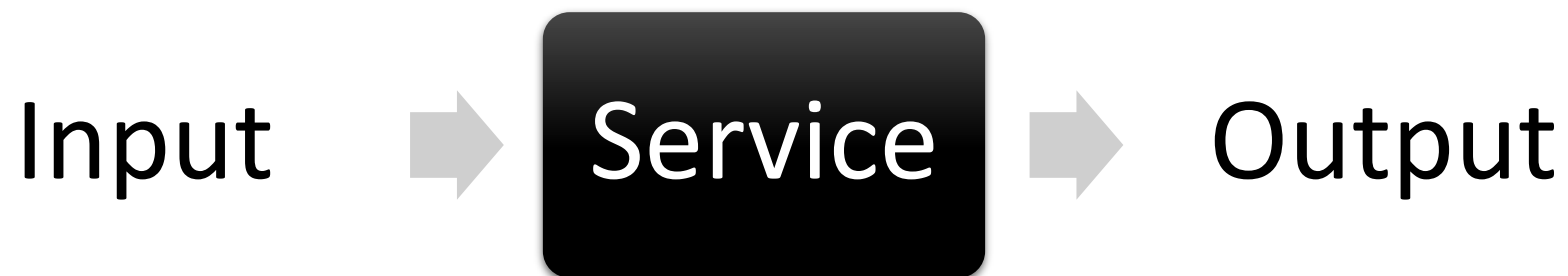
Disadvantages of API Testing

Does not ensure that the client is working properly

Requires a more technical knowledge

To verify full response data might be an overwhelming effort

Understand Web Service Testing



Dev Tools Demo: <http://api.mathjs.org/>

SOAP & REST

SOAP vs. REST	SOAP (Simple Object Access Protocol)	REST (Representational State Transfer)
Meaning:	A standard communication protocol	An architectural style of the web services
Function:	Function driven: transfer well structured information	Data driven: access a resource for data transfer
Data format:	Only XML (WSDL)	Many data formats: plain text, HTML, XML, JSON ...
Bandwidth:	Requires more bandwidth	Lightweight (due to data format)
Security:	SSL and WS-Security	SSL and HTTPS
Payload handling:	Strict communication contract	No contract needed

XML & JSON

XML and JSON

self describing, hierarchical, easily parsed, can be fetched within a request

XML:

supports namespaces and comments

JSON:

shorter, no end tag, quicker to parse

```
1 <?xml version="1.0" encoding="UTF-8" ?>
2 <employees>
3   <employee>
4     <id>1</id>
5     <firstName>John</firstName>
6     <lastName>Smith</lastName>
7     <email>john.smith@company.com</email>
8   </employee>
9   <employee>
10    <id>2</id>
11    <firstName>John</firstName>
12    <lastName>Doe</lastName>
13    <email>john.doe@company.com</email>
14  </employee>
15 </employees>
```

```
1 {
2   "employees": {
3     "employee": [
4       {
5         "id": "1",
6         "firstName": "John",
7         "lastName": "Smith",
8         "email": "john.smith@company.com"
9       },
10      {
11        "id": "2",
12        "firstName": "John",
13        "lastName": "Doe",
14        "email": "john.doe@company.com"
15      }
16    ]
17  }
18 }
```

XML: 297 chars

JSON: 188 chars

XML to JSON: ~37% less

JSON to XML: ~58% more

API Verbs (Actions)

POST

- **Create**
- Create something new

GET

- **Read**
- Retrieve some information

PUT

- **Update**
- Acts on already existing information

DELETE

- **Delete**
- Delete information

...

- PATCH, HEAD, OPTIONS ...

Testing Calls

- GET

- Test what you get back
 - Verify status codes
 - Verify response payload
 - Verify application state
 - Verify roles/permissions

- POST

- Create new information
 - Is the data secured after creation?
 - Is the data linked to the proper user?

- PUT

- Update information
 - Do the changes need to be tracked?
 - Can you update any fields? Like ID

- DELETE

- Delete information
 - Do you have permissions to delete?
 - Can you delete anything?
 - Can you delete shared data?
 - Can you delete object with child data?

Check for consistency for both request and response!

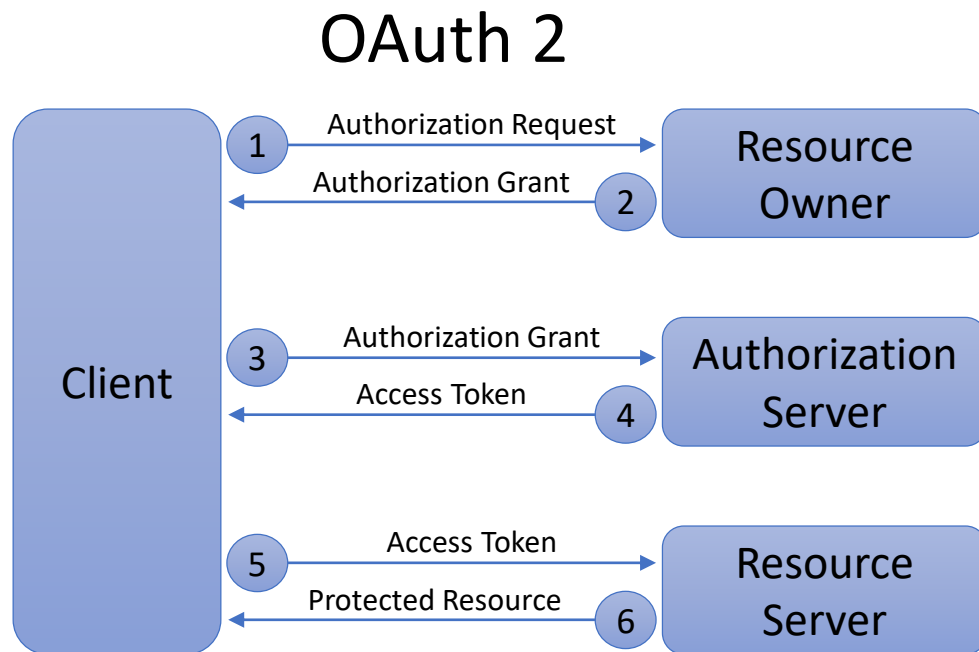
What?

(Some) Response Codes

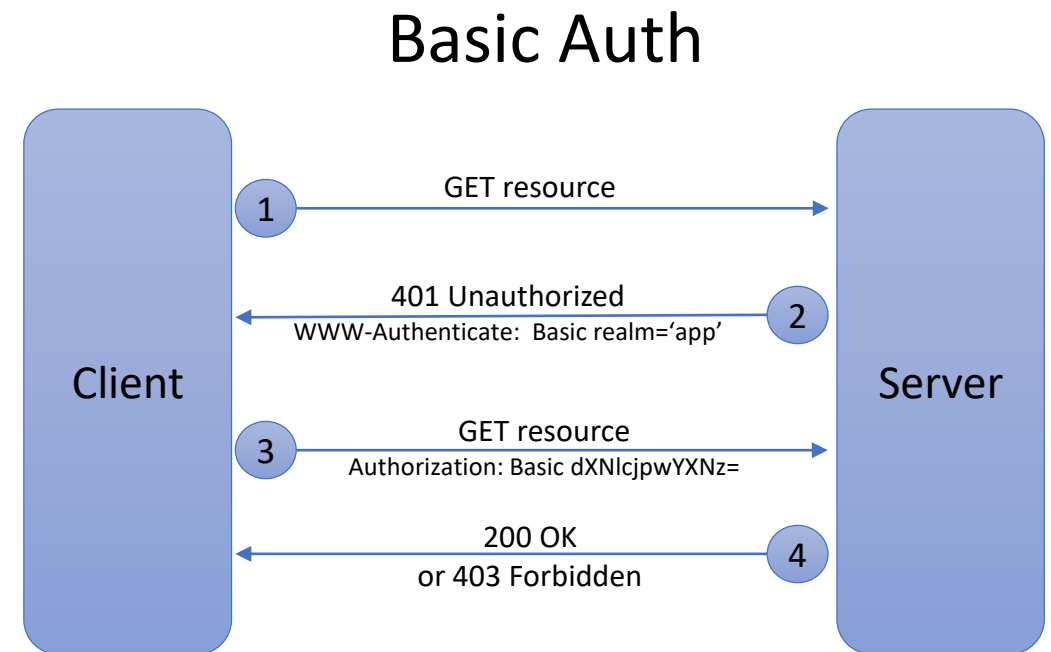
1XX INFORMATIONAL	2XX SUCCESS	3XX REDIRECTION	4XX CLIENT ERROR	5XX SERVER ERROR
100 Continue 101 Switching Protocols 102 Processing	200 OK 201 Created 202 Accepted 203 Non-Authoritative Information 204 No Content	300 Multiple Choices 301 Moved Permanently 302 Found 303 See Other 304 Not Modified	400 Bad Request 401 Unauthorized 402 Payment Required 403 Forbidden 404 Not Found	500 Internal Server Error 501 Not Implemented 502 Bad Gateway 503 Service Unavailable 504 Gateway Timeout

API Security

- Authentication and Authorization



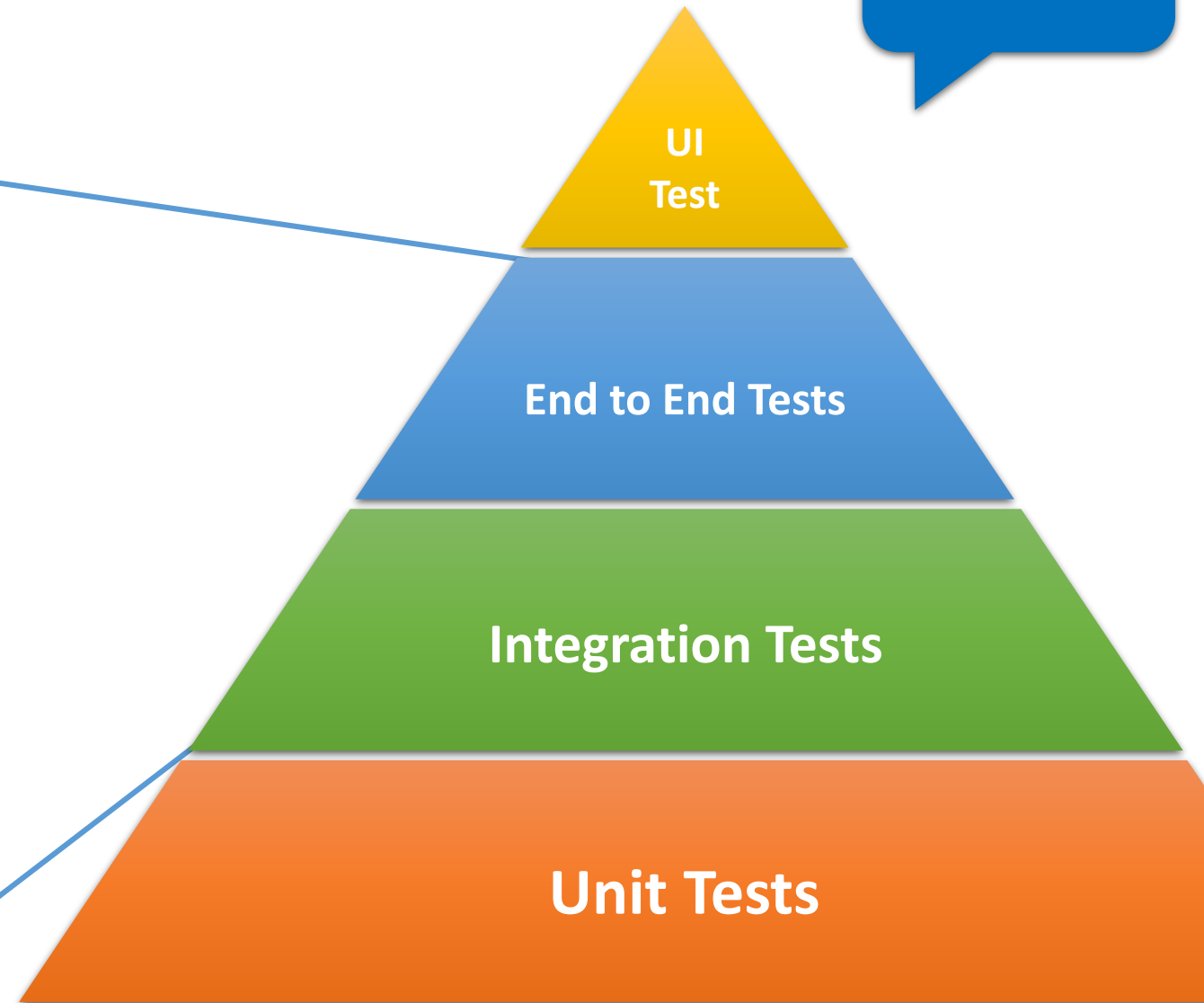
&



Who?

API Testing Types

- ✓ Functional Testing
 - ✓ “Unit” Testing
 - ✓ Integration Testing
 - ✓ End-to-End Testing
- ✓ Performance Testing
- ✓ Security Testing



JMeter Overview



How?

- Download JMeter: https://jmeter.apache.org/download_jmeter.cgi

Apache JMeter 5.3 (Requires Java 8+)

Binaries

[apache-jmeter-5.3.tgz sha512 pgp](#)
[apache-jmeter-5.3.zip sha512 pgp](#)

Source

[apache-jmeter-5.3_src.tgz sha512 pgp](#)
[apache-jmeter-5.3_src.zip sha512 pgp](#)

This PC > Data (D:) > apache-jmeter-5.3 > bin			
Name	Date modified	Type	Size
examples	2/1/1980 12:00 AM	File folder	
report-template	2/1/1980 12:00 AM	File folder	
templates	2/1/1980 12:00 AM	File folder	
ApacheJMeter	11/2/2020 10:02 AM	Executable Jar File	14 KB
BeanShellAssertion.bshrc	11/2/2020 10:02 AM	BSHRC File	2 KB
BeanShellFunction.bshrc	11/2/2020 10:02 AM	BSHRC File	3 KB
BeanShellListeners.bshrc	11/2/2020 10:02 AM	BSHRC File	2 KB
BeanShellSampler.bshrc	11/2/2020 10:02 AM	BSHRC File	3 KB
create-rmi-keystore	11/2/2020 10:02 AM	Windows Batch File	2 KB
create-rmi-keystore	11/2/2020 10:02 AM	Shell Script	2 KB
hc.parameters	11/2/2020 10:02 AM	PARAMETERS File	2 KB
heapdump	11/2/2020 10:02 AM	Windows Comma...	2 KB
heapdump	11/2/2020 10:02 AM	Shell Script	1 KB
jaas.conf	11/2/2020 10:02 AM	CONF File	2 KB
jmeter	11/2/2020 10:02 AM	File	9 KB
jmeter	11/2/2020 10:02 AM	Windows Batch File	9 KB



API Tests using JMeter

- Application being tested: **Trello**
 - <https://trello.com/>
- **Trello API Introduction**
 - <https://developer.atlassian.com/cloud/trello/guides/rest-api/api-introduction/>
- **Trello API group actions**
 - <https://developer.atlassian.com/cloud/trello/rest/api-group-actions/>
- **Generate API Key and Token**
 - <https://trello.com/app-key>

Trello API DEMO

- Create a board
 - POST <https://api.trello.com/1/boards>
 - Parameters: key=<yourKey>&token=<yourToken>
name= <YourBoardName>
- Read a board
 - GET <https://api.trello.com/1/boards/<boardId>>
 - Parameters: key=<yourKey>&token=<yourToken>
- Update a board
 - PUT <https://api.trello.com/1/boards/<boardId>>
 - Parameters: key=<yourKey>&token=<yourToken>
name= <YourNewBoardName>
- Delete a board
 - DELETE <https://api.trello.com/1/boards/<boardId>>
 - Parameters: key=<yourKey>&token=<yourToken>

JMeter Demo: <https://trello.com/>

References

- <https://www.softwaretestinghelp.com/api-testing-tutorial/>
- <https://www.guru99.com/api-testing.html>
- <https://www.guru99.com/comparison-between-web-services.html>
- <https://smartbear.com/blog/test-and-monitor/soap-vs-rest-whats-the-difference/>
- <https://www.linkedin.com/learning/api-testing-foundations/stand-out-as-an-api-tester>

Questions?