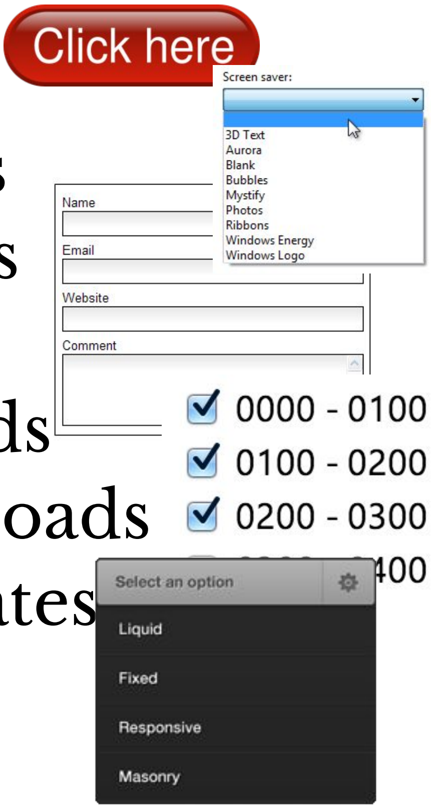
Performance testing

Required technical knowledge

User workflow vs Application workflow

- User
  - Clicks
  - Selects
  - Checks
  - Types
  - Uploads
  - Downloads
  - Navigates



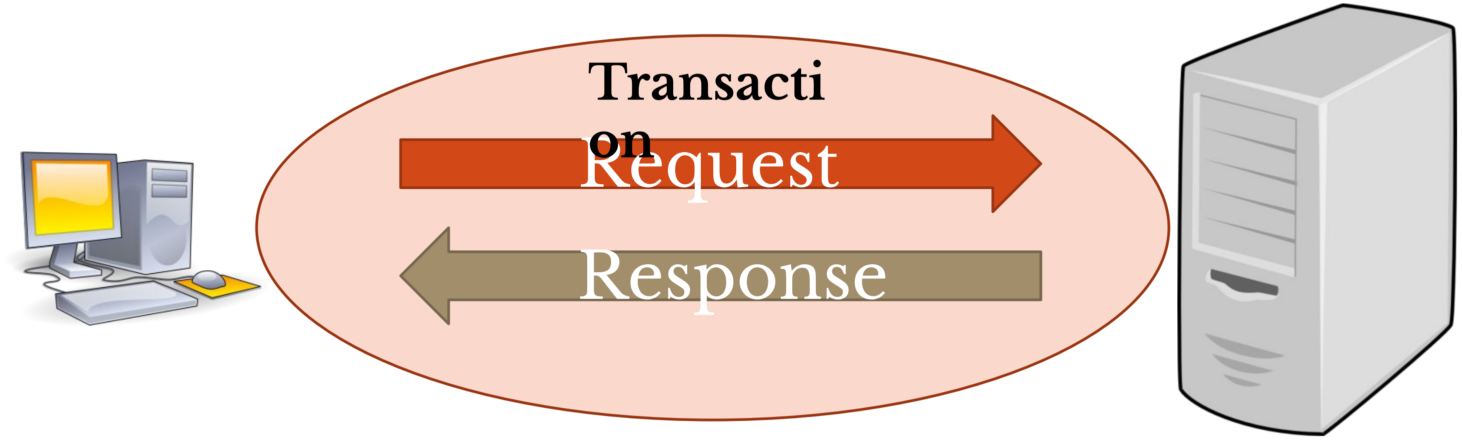
- Application
  - Sends request
  - Receives response
  - Sends request
  - Receives response
  - Sends request
    - Receives sub-response
    - Sends sub-request
    - Receives sub-response
    - Sends sub-request
  - Receives response

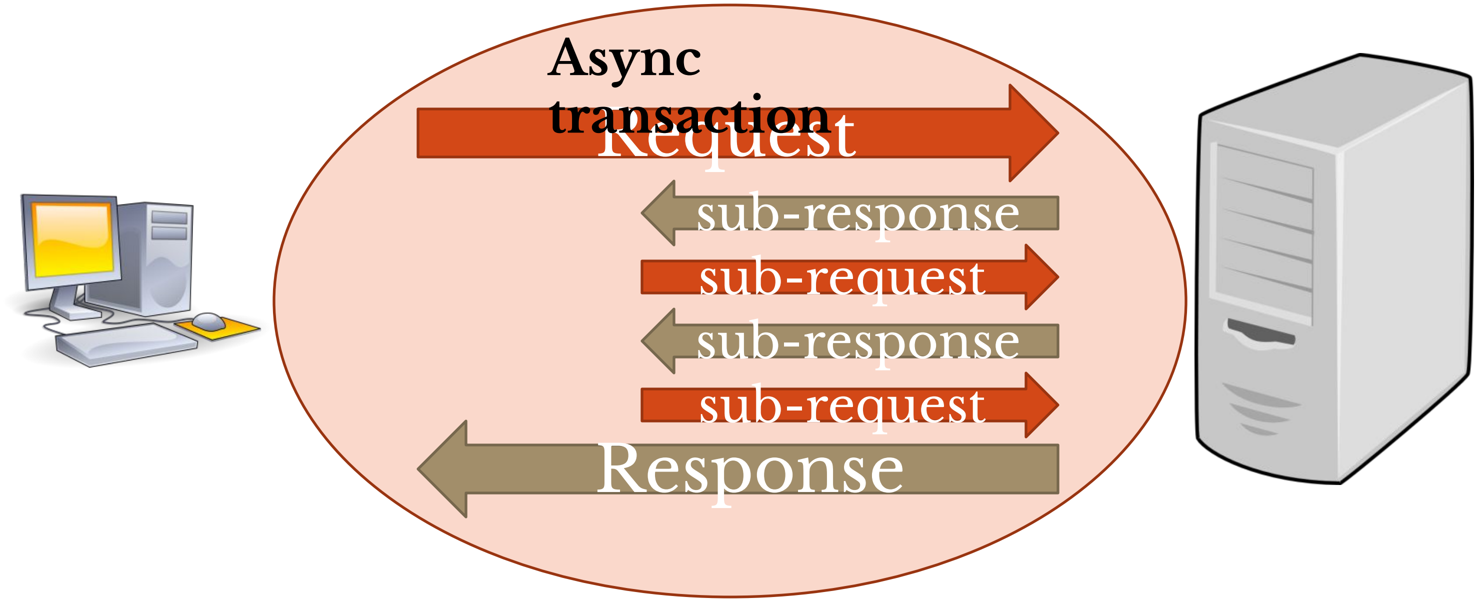
NOT

Performance tests

THI

Client-server application architecture





Request structure

- Protocol/method
- Headers
- Data
- Attachments

Response structure

- Protocol/method
- Headers
- Data
- Attachments

HTTP Protocol

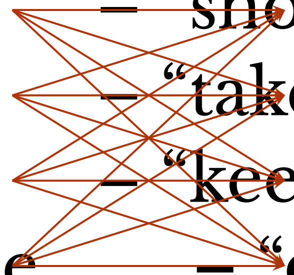
- Methods
  - Get $\rightarrow$ – “show me the data that I want”
  - Post $\rightarrow$ – “take the data and process it”
  - Put $\rightarrow$ – “keep the data please”
  - Delete $\rightarrow$ – “delete the data please”
  - +5 more

Each method has its own role

Theoretically | Best Practices | Classic approach

HTTP Protocol

- Methods
  - Get – “show me the data that I want”
  - Post – “take the data and process it”
  - Put – “keep the data please”
  - Delete – “delete the data please”
  - +5 more



Technically – “Nothing is impossible”

“Always be prepared...”

HTTP Protocol

- Examples where http methods are used properly:
  - in public web services
  - in projects where coding best practices are strictly followed

- Examples where http methods can be messed up:
  - in http server based web applications
  - in projects where best practices aren't strictly enforced

- "Bad" practices that you can face
  - use POST for searches
  - use POST to delete something
  - never use DELETE, PUT
  - etc.

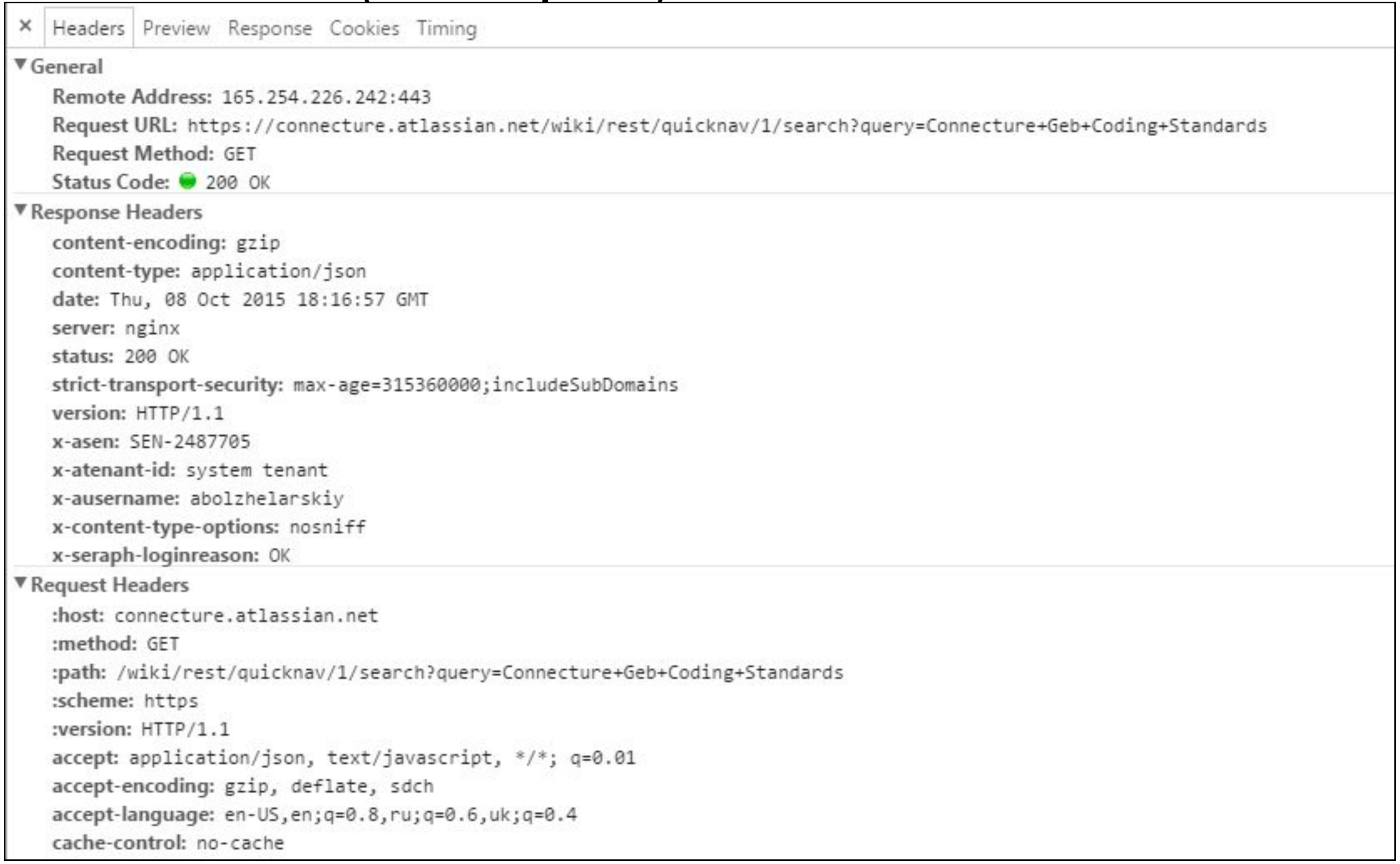
"Always be prepared..."

HTTP Protocol

- Headers
  - format – [header name]:[header value]
  - groups
    - General Headers – must bet present in ALL requests
    - Request Headers – are present in CLIENT requests only
    - Response Headers – are present in SERVER responses only
    - Entity Headers – details related to content of a request/response
  - some headers belong to few groups

HTTP Protocol

- Headers (examples)



```
▼General
    Remote Address: 165.254.226.242:443
    Request URL: https://connecture.atlassian.net/wiki/rest/quicknav/1/search?query=Connecture+Geb+Coding+Standards
    Request Method: GET
    Status Code: ● 200 OK
▼Response Headers
    content-encoding: gzip
    content-type: application/json
    date: Thu, 08 Oct 2015 18:16:57 GMT
    server: nginx
    status: 200 OK
    strict-transport-security: max-age=315360000;includeSubDomains
    version: HTTP/1.1
    x-asen: SEN-2487705
    x-atenant-id: system tenant
    x-ausername: abolzhelarskiy
    x-content-type-options: nosniff
    x-seraph-loginreason: OK
▼Request Headers
    :host: connecture.atlassian.net
    :method: GET
    :path: /wiki/rest/quicknav/1/search?query=Connecture+Geb+Coding+Standards
    :scheme: https
    :version: HTTP/1.1
    accept: application/json, text/javascript, */*; q=0.01
    accept-encoding: gzip, deflate, sdch
    accept-language: en-US,en;q=0.8,ru;q=0.6,uk;q=0.4
    cache-control: no-cache
```

HTTP Protocol

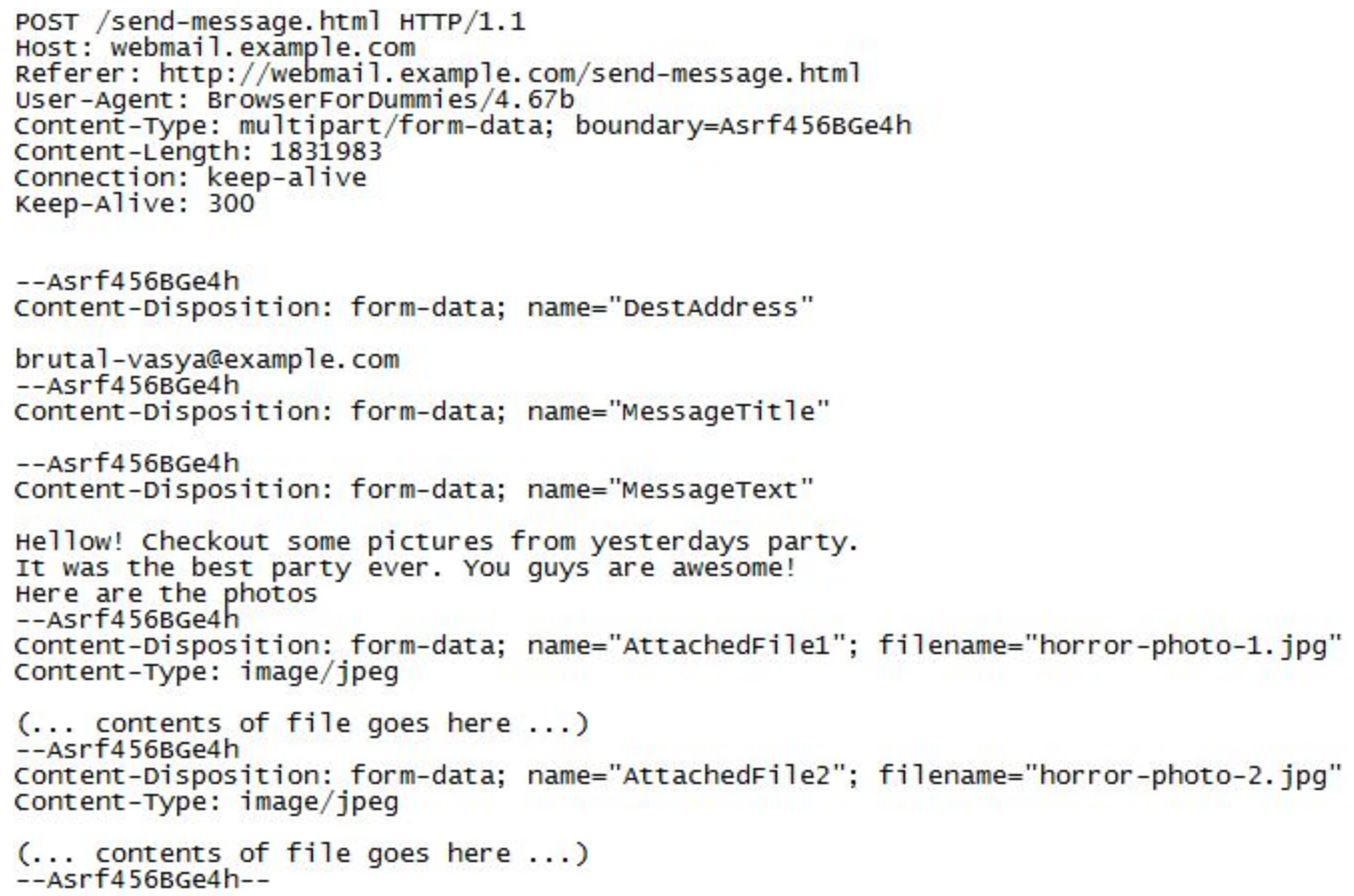
- Message body
  - Optional
  - Content
    - Overall: any text can be sent
    - In particular: text that target server understands
    - + Entity Headers if/where needed

HTTP Protocol

- ~~Attachments~~ Message body
  - Sent in forms
  - Key http headers:
    - Content-Type: multipart/form-data
    - Content-Disposition: form-data
    - Content-Type:[text/plan | application/x-object | etc.]

HTTP Protocol

- Message body (example)



```
POST /send-message.html HTTP/1.1
Host: webmail.example.com
Referer: http://webmail.example.com/send-message.html
User-Agent: BrowserForDummies/4.67b
Content-Type: multipart/form-data; boundary=Asrf456BGe4h
Content-Length: 1831983
Connection: keep-alive
Keep-Alive: 300


--Asrf456BGe4h
Content-Disposition: form-data; name="DestAddress"

brutal-vasya@example.com
--Asrf456BGe4h
Content-Disposition: form-data; name="MessageTitle"

--Asrf456BGe4h
Content-Disposition: form-data; name="MessageText"

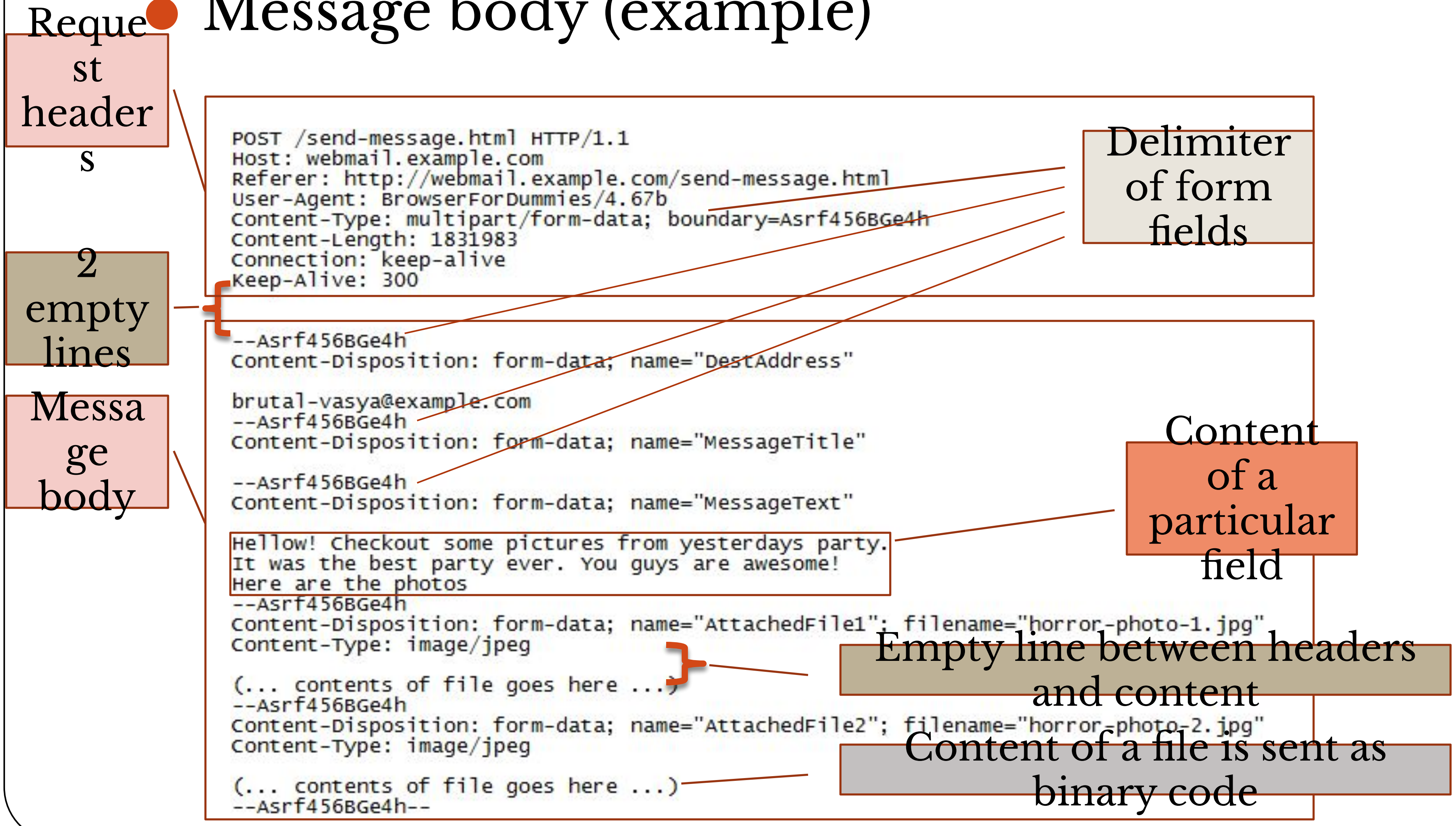
Hellow! Checkout some pictures from yesterdays party.
It was the best party ever. You guys are awesome!
Here are the photos
--Asrf456BGe4h
Content-Disposition: form-data; name="AttachedFile1"; filename="horror-photo-1.jpg"
Content-Type: image/jpeg

(... contents of file goes here ...)
--Asrf456BGe4h
Content-Disposition: form-data; name="AttachedFile2"; filename="horror-photo-2.jpg"
Content-Type: image/jpeg

(... contents of file goes here ...)
--Asrf456BGe4h--
```

HTTP Protocol

- Message body (example)



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POST /send-message.html HTTP/1.1
Host: webmail.example.com
Referer: http://webmail.example.com/send-message.html
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Content-Disposition: form-data; name="MessageTitle"

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Content-Disposition: form-data; name="MessageText"

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(... contents of file goes here ...)
--Asrf456BGe4h
Content-Disposition: form-data; name="AttachedFile2"; filename="horror-photo-2.jpg"
Content-Type: image/jpeg

(... contents of file goes here ...)
--Asrf456BGe4h--
```

Request headers
2 empty lines
Message body
Delimiter of form fields
Content of a particular field
Empty line between headers and content
Content of a file is sent as binary code

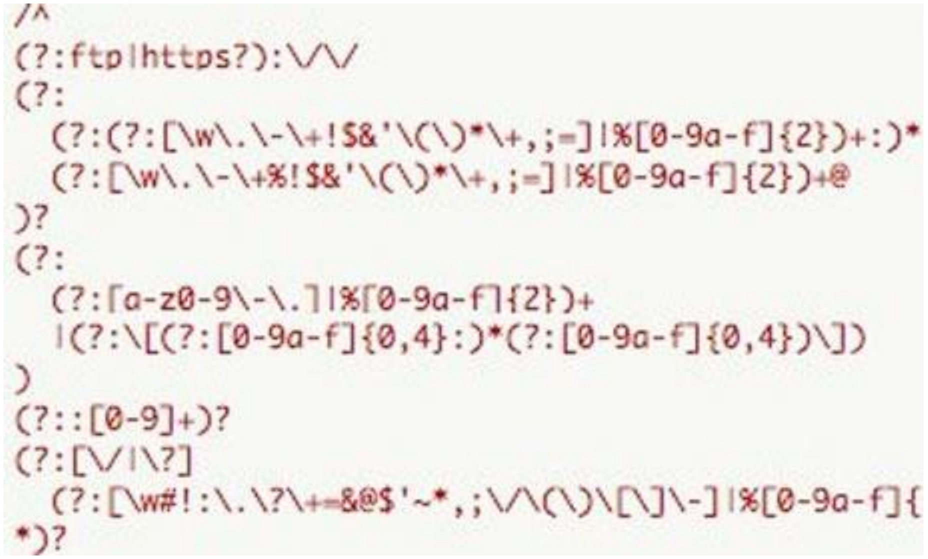
HTTP Protocol

- Status codes
  - 1xx Informational
    - Request received, continuing process
  - 2xx Success
    - Request was received, understood, accepted and processed successfully
  - 3xx Redirection
    - Client must take additional action to complete the request
  - 4xx Client Error
    - Client seems to have erred
  - 5xx Server Error
    - The server failed to fulfil an apparently valid request

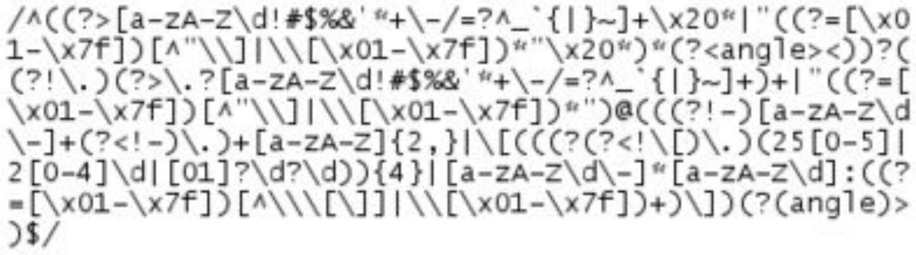
HTTP Protocol

- Status codes:
  - We knew it!:
    - 200 – everything is OK
    - 401 – something is wrong with sent credentials
    - 404 – requested page is absent
    - 500 – server is down
  - Do you know more codes?
    - 1xx – 3 codes
    - 2xx – 10 codes
    - 3xx – 10 codes
    - 4xx – 43 codes
    - 5xx – 16 codes

Regular expressions



```
/^
(?:ftp|https?):\/\/
(?:
  (?:(?:[\w\.\-\+!$&'\(\)*\+,;=]|%[0-9a-f]{2})+:)*
  (?:[\w\.\-\+%!$&'\(\)*\+,;=]|%[0-9a-f]{2})+@
)?
(?:
  (?:[a-z0-9\-\.]|%[0-9a-f]{2})+
  |(?:\[(?:[0-9a-f]{0,4}:)*(?:[0-9a-f]{0,4})\])
)
(?::[0-9]+)?
(?:[\/|\?]
  (?:[\w#!:\.\?\+=&@$'~*,;\/\(\)\[\]\-]|%[0-9a-f]{
*)?
```



```
/^((?>[a-zA-Z\d!#$%&'*+\-/=?^_`{|}~]+\x20*|"((?=[\x0
1-\x7f])[^"\\]|\\[\x01-\x7f])*"\x20*)*(?<angle><))?(
(?!\.)(?>\.?[a-zA-Z\d!#$%&'*+\-/=?^_`{|}~]+)+|"((?=[
\x01-\x7f])[^"\\]|\\[\x01-\x7f])*")@(((?!-)[a-zA-Z\d
\-]+(?<!-)\.)+[a-zA-Z]{2,}|\[(((?(?<!\[)\.)(25[0-5]|
2[0-4]\d|[01]?\d?\d)){4}|[a-zA-Z\d\-]*[a-zA-Z\d]:((?
=[\x01-\x7f])[^\\\[\]]|\\[\x01-\x7f])+)\])(?(angle)>
)$/
```

```
^([0-9a-zA-Z]+([_.-]?[0-9a-zA-Z]+)*@[0-9a-zA-Z]+[0-9,a-z,A-Z,.,-
]*(.){1}[a-zA-Z]{2,4})+$

^#?([a-f]|[A-F]|[0-9]){3}(([a-f]|[A-F]|[0-9]){3})?$

^[a-zA-Z0-9-_\.]+\.(jpg|gif|png)$

^((25[0-5]|2[0-4][0-9]|1[0-9]{2}|[0-9]{1,2})\.){3}(25[0-5]|2[0-4][0-
9]|1[0-9]{2}|[0-9]{1,2})$

^[a-zA-Z0-9-_\.]+\.(swf|mov|wma|mpg|mp3|wav)$

^\d{4}-(0[0-9]|1[0,1,2])-([0,1,2][0-9]|3[0,1])$

^[2-9]\d{2}-\d{3}-\d{4}$

^([0-1][0-9]|[2][0-3])(:([0-5][0-9])){1,2}$

^(http[s]?://|ftp://)?(www\.)?[a-zA-Z0-9-\.]+\.
(com|org|net|mil|edu|ca|co.uk|com.au|gov)$

^(([0-9]{1})*[- .(]*([0-9a-zA-Z]{3})*[- .)]*[0-9a-zA-Z]{3}[- .]*[0-9a-zA-
Z]{4})+$
```

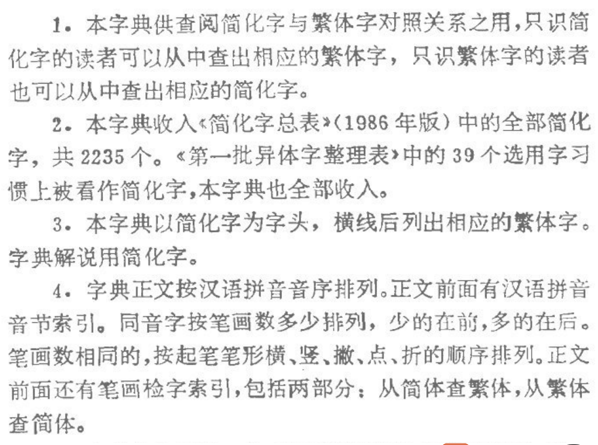
Regular expressions

- Regular expressions are quite easy to learn

Regular expressions

- But doing this by slides is as easy…

Regular expressions



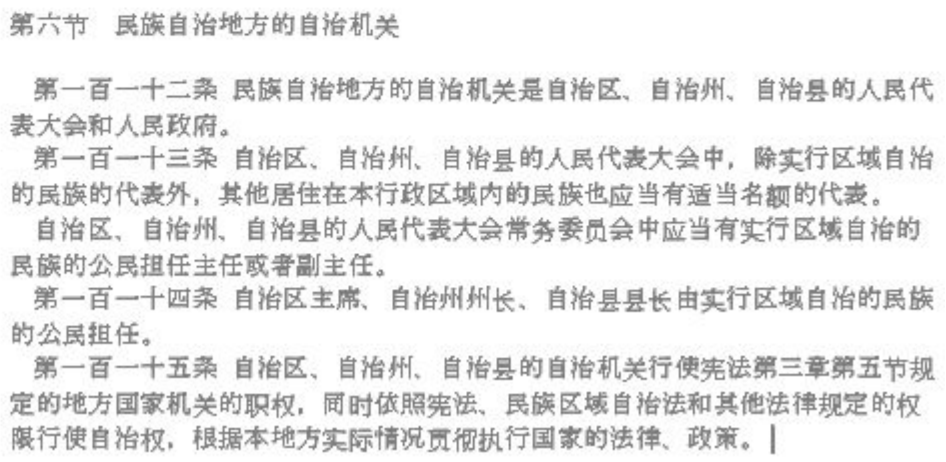
1. 本字典供查阅简化字与繁体字对照关系之用,只识简化字的读者可以从中查出相应的繁体字，只识繁体字的读者也可以从中查出相应的简化字。

2. 本字典收入«简化字总表»(1986 年版）中的全部简化字，共 2235 个。«第一批异体字整理表»中的 39 个选用字习惯上被看作简化字,本字典也全部收入。

3. 本字典以简化字为字头，横线后列出相应的繁体字。字典解说用简化字。

4. 字典正文按汉语拼音音序排列。正文前面有汉语拼音音节索引。同音字按笔画数多少排列，少的在前,多的在后。笔画数相同的,按起笔笔形横、竖、撇、点、折的顺序排列。正文前面还有笔画检字索引,包括两部分：从简体查繁体,从繁体查简体。

- …as learning Chinese



第六节　民族自治地方的自治机关

第一百一十二条 民族自治地方的自治机关是自治区、自治州、自治县的人民代表大会和人民政府。

第一百一十三条 自治区、自治州、自治县的人民代表大会中，除实行区域自治的民族的代表外，其他居住在本行政区域内的民族也应当有适当名额的代表。

自治区、自治州、自治县的人民代表大会常务委员会中应当有实行区域自治的民族的公民担任主任或者副主任。

第一百一十四条 自治区主席、自治州州长、自治县县长由实行区域自治的民族的公民担任。

第一百一十五条 自治区、自治州、自治县的自治机关行使宪法第三章第五节规定的地方国家机关的职权，同时依照宪法、民族区域自治法和其他法律规定的权限行使自治权，根据本地方实际情况贯彻执行国家的法律、政策。

Regular expressions

- You will have to learn it by yourself

Regular expressions

- Theory
  - https://en.wikipedia.org/wiki/Regular_expression
  - http://www.rexegg.com/
- Interactive online tutorial
  - http://regexone.com/
- Online regular expression
  - http://rubular.com/
  - http://www.regexr.com/
  - https://regex101.com/#javascri
- Desktop regular expression
  - http://www.weitz.de/regex-coach/

Regular expressions

- But here is some basic understanding

Regular expressions

- What to search
- Where to search
- How many times it should appear

- Searching algorithm

Regular expressions

- What to search

- Characters abc123
  - *use backslash for meta characters!* ^$.?*
- Character classes []
- Groups ()
- Alternatives |

Regular expressions

- Where to search

- Start/End of text ^ and $
- Start/End of a word \b
- After text ?=<
- Before text ?=

Regular expressions

- How many times it should appear (quantification)

- Particular number of times {n}
- Range {m, n}
- Not less then {m,}
- Not more then {,n}
- Zero or one time ?
- Zero or any number of times *
- One or more times +

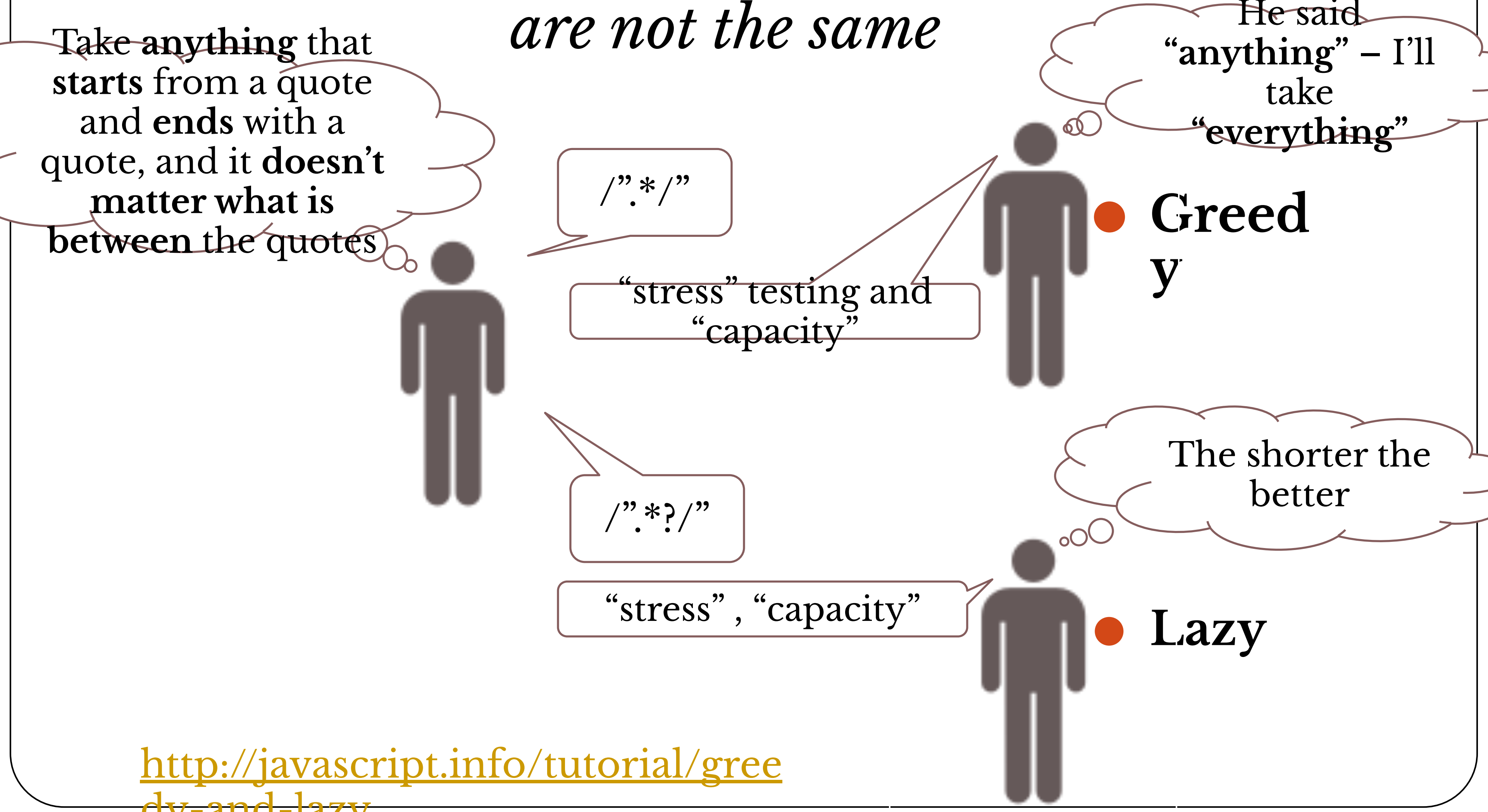
Regular expressions

- Searching algorithm

- **Greedy**
  - repeat a quantifier as many times as possible
- **Lazy**
  - Repeat a quantifier as little as possible

Regular expressions

***Example:** "stress" testing and "capacity" testing are not the same*


Take **anything** that **starts** from a quote and **ends** with a quote, and it **doesn't matter what is between** the quotes
/".*/"
"stress" testing and "capacity"
He said "**anything**" – I'll take "**everything**"
/".*?/"
"stress" , "capacity"
The shorter the better

- **Greedy**
- **Lazy**

http://javascript.info/tutorial/greedy-and-lazy

Tools that can help

- SoapUI
  - Check available functions on an endpoint (WADL/WSDL)
    - List of all functions
    - Structure of request/response
  - Try your requests before using them in JMeter
- Developer Tools (Chrome browser)
  - Compare requests in your tests with requests sent by application
    - Headers
    - Content
    - Cookies

Tools that can help

- SoapUI http://www.soapui.org
  - Chapters recommended for reading/watching
    - About SoapUI
      - Videos
        - Functional Testing
        - REST Testing
    - Getting started
      - Installing SoapUI
      - Your First SoapUI Project
      - REST Testing
    - SOAP and WSDL
      - Operations and Requests
      - Headers and Attachments
    - REST
      - Understanding REST Parameters

Tools that can help

- Chrome Developer Tools https://developer.chrome.com/devtools/docs/network
  - Network tab is the most important here
  - **Note!** Even if you have been working with Chrome Developer Tools for ages we strongly recommend you to read the tool documentation anyway.

Questio
ns?