

A photograph of a man with dark hair and a red beard holding a blue and green globe of the Earth. He is wearing a red shirt and has his hands on the globe. The background is dark.

Web Architecture

<http://www.flickr.com/photos/restlessglobetrotter>



Aims (pm)

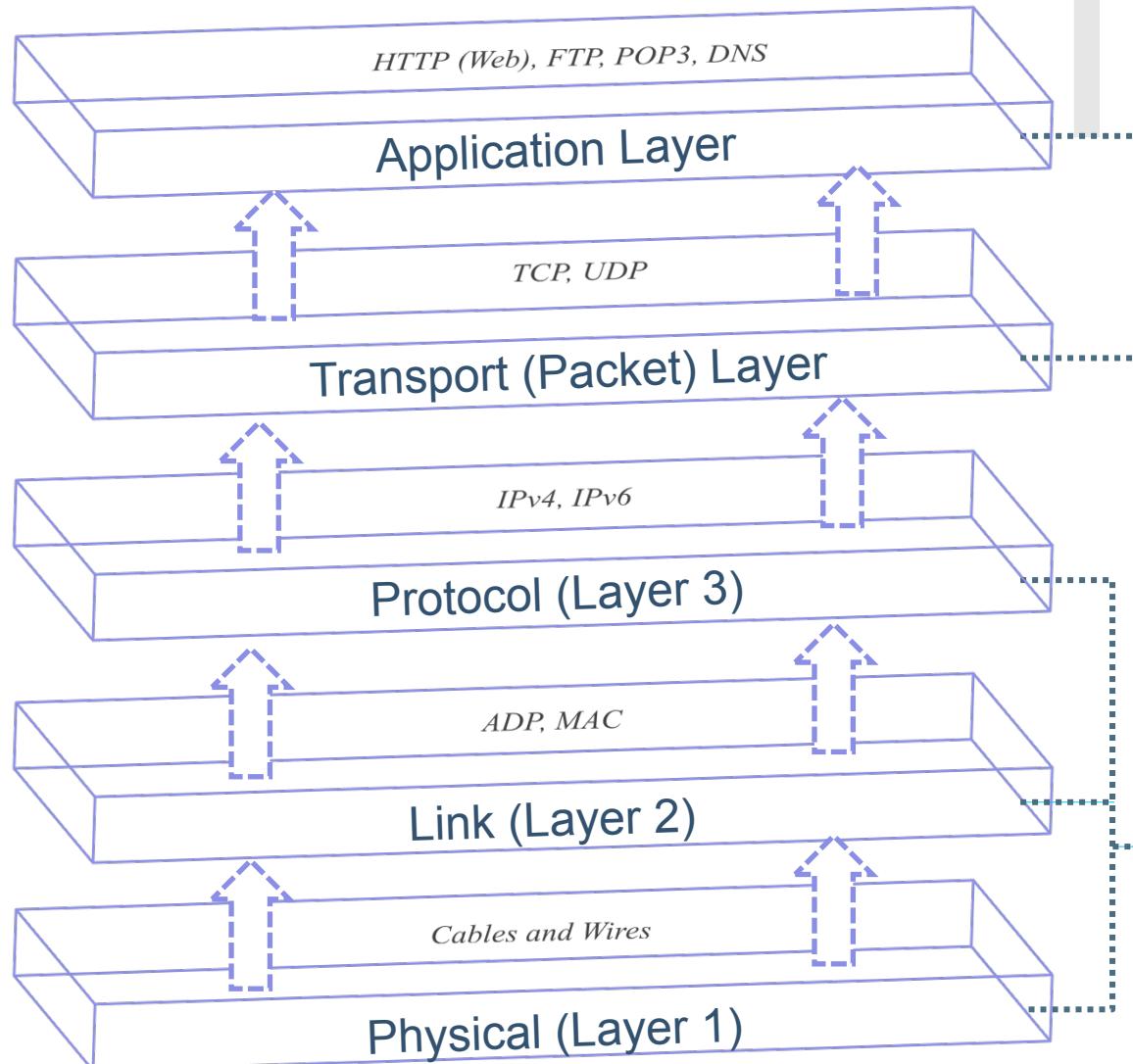
- Building blocks of the web.
 - Layers, URLs and URIs
- How do machines see the web?
- Content negotiation and the web API / web of data



Question 1

What is the difference between
the Web and the Internet?

The Internet



Application Layer

A Bus

Transport Layer

Like a road

3 main “physical” layers

Think of these like foundations

Web Jargon

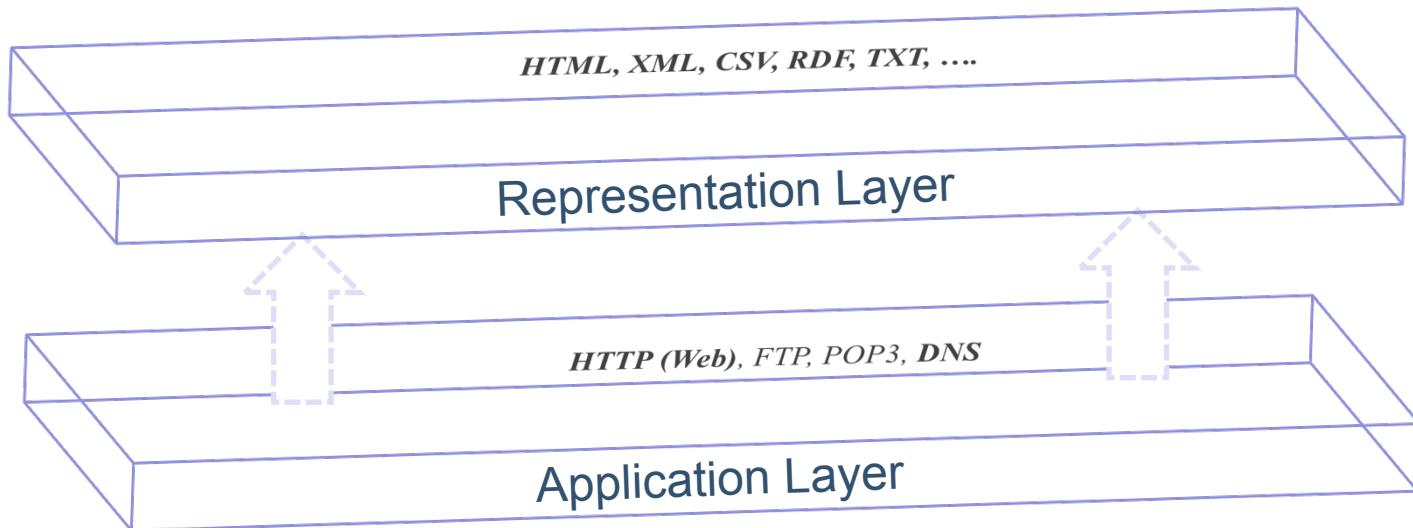


HTTP: HyperText Transfer Protocol

HTML: HyperText Markup Language

DNS: Domain Name resolution System

Representation Layer



The Web Bit



Resources are identified using URIs,
URLs and URNs

A Web is made via linking resources
together

Resources

URI

`http://weather.example.com/oaxaca`

Representation

Metadata:
Content-type:
`application/xhtml+xml`

Data:

```
<!DOCTYPE html PUBLIC "...  
    "http://www.w3.org/..."  
    <html xmlns="http://www...  
        <head>  
        <title>5 Day Forecast for  
        Oaxaca</title>  
        ...  
    </html>
```

Identifies

Represents

Resource

Oaxaca Weather Report

Data
People
Places
Things
Multimedia
Scientific Structures
Publications
Workflows

Databases

**Identifiers refer to a resource
in the application layer, not
the representation layer.**

UR What?

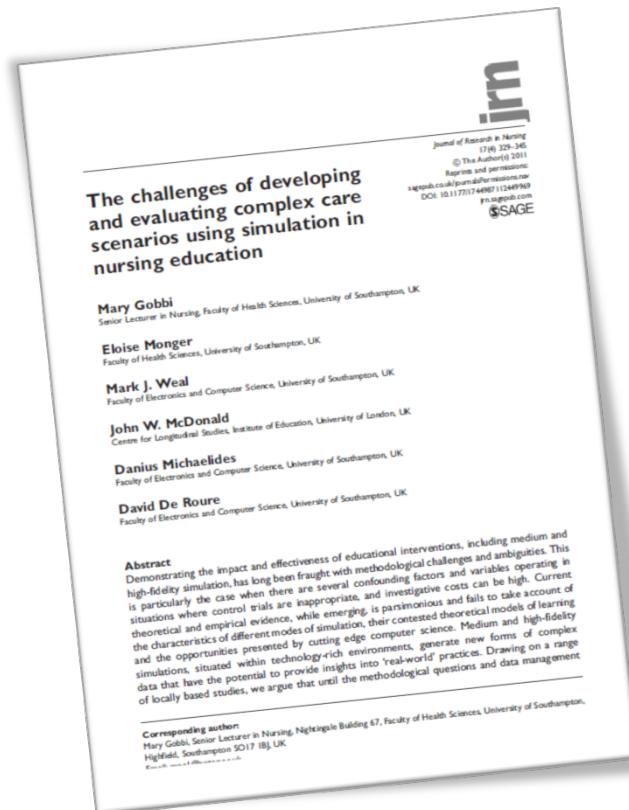
ISSN: 1744-988X

<http://eprints.soton.ac.uk/id/eprint/341927>

doi:10.1177/1744987112449969

<http://eprints.soton.ac.uk/341927/>

ISSN: 1361-4096



UR What?

ISSN: 1744-988X

<http://eprints.soton.ac.uk/id/eprint/341927>

doi:10.1177/1744987112449969

<http://eprints.soton.ac.uk/341927/>

ISSN: 1361-4096

These are all identifiers for the same thing.

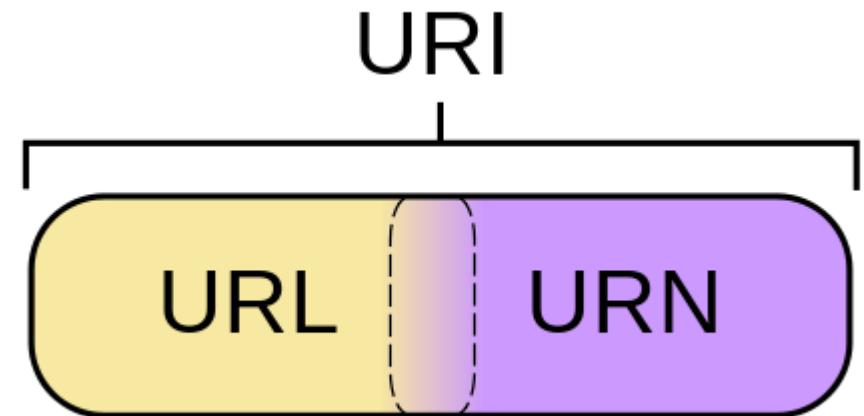
This one thing might be available in many representations:

- Book
- eBook
- PDF
- HTML
- Word Doc

URN:

Uniform Resource Name

Persistent
Location Independent
Identifier



http://en.wikipedia.org/wiki/File:URI_Euler_Diagram_no_lone_URLs.svg



<http://www.ietf.org/rfc/rfc2141>



http://

Uniform Resource Locator

Tells you how and where to
find an instance of a resource



<https://www.google.co.uk:80/search?q=what+is+an+isbn#rcnt>



<http://www.ietf.org/rfc/rfc1738>



http://

Uniform Resource Locator



https://www.google.co.uk:80/search?q=what+is+an+isbn#rcnt

1 2 3 4 5 6

1: The Protocol (from the application layer)

2: The Address (think street address)

3: The Port (think flat number)

4: The Path (think item in flat)

5: Parameters (what to request of that item)

6: Fragment (what part of the returned content to look at)

[http://](http://.....)

Uniform Resource Identifier

An Identifier for a Resource

Uses the URL syntax to aid in Identification



<http://id.ecs.soton.ac.uk/person#7113>

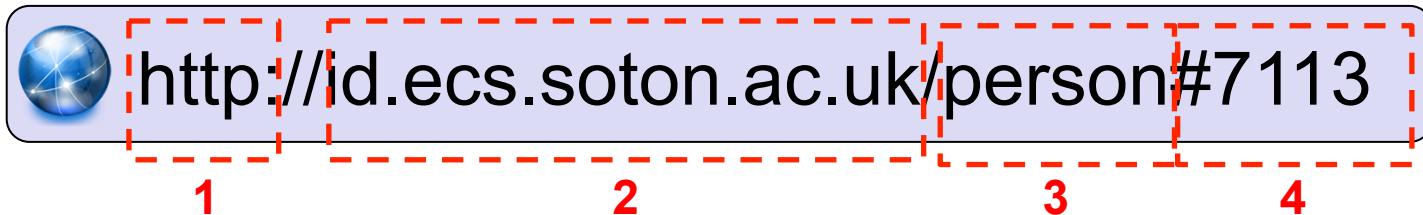


<http://www.ietf.org/rfc/rfc3986>



http://

Uniform Resource Identifier



- 1: The Protocol (this is a web based URI)
- 2: The Authority (think organisation)
- 3: The Path (think database table)
- 4: The Resource (think item)

UR What?



<http://www.bbc.co.uk/music/artists/24f1766e-9635-4d58-a4d4-9413f9f98a4c>



<https://github.com/theodi/hot-drinks.git>



[urn:isbn:0451450523](#)



<mailto:davetaz@theodi.org>



<ftp://anonymous@files.cnet.com/software/JaSFTP/jasftp.msi>



<doi:10.3998/3336451.0004.203>



<http://id.ecs.soton.ac.uk/person/7113>



http://dbpedia.org/resource/Open_Data_Institute



<http://www.ecs.soton.ac.uk/people/timbl/index.html>



http://en.wikipedia.org/wiki/Open_Data_Institute



file:///home/davetaz/Documents/ODI/Open_Data_In_Practise.pptx



[urn:uuid:24f1766e-9635-4d58-a4d4-9413f9f98a4c](#)



<http://www.ecs.soton.ac.uk/people/timbl>

Making a # of it!



<http://id.ecs.soton.ac.uk/person#7113>

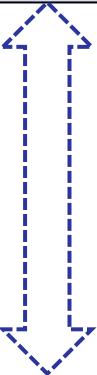
How would I request the name of person #1733?

Don't make a % of it

Internationalised Resource Identifier (IRI)



http://ヒキワリ.ナットウ.ニホン



http://%E3%83%92%E3%82%AD%E3%83%AF%E3%83%AA.%E3%83%8A
%E3%83%83%E3%83%88%E3%82%A6.%E3%83%8B%E3%83%9B%E3%83%B3

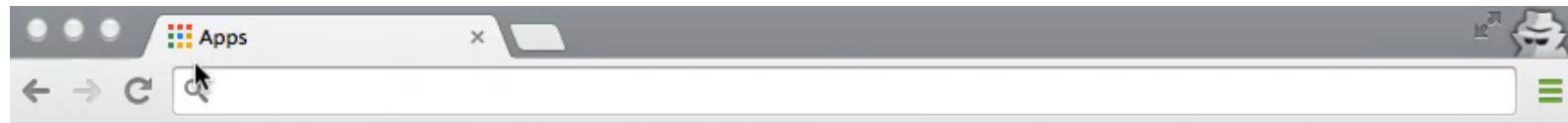


HTTP

HyperText Transfer Protocol

more than just http://

How we use the web



You've gone **incognito**. Pages you view in incognito tabs won't stick around in your browser's history, cookie store, or search history after you've closed all of your incognito tabs. Any files you download or bookmarks you create will be kept.



However, you aren't invisible. Going incognito doesn't hide your browsing from your employer, your internet service provider, or the websites you visit.

[Learn more about incognito browsing.](#)



Because Google Chrome does not control how extensions handle your personal data, all extensions have been disabled for incognito windows. You can reenable them individually in the [extensions manager](#).

What decisions were taken for you?

- 1) Google.com redirected to google.co.uk
- 2) Searching google.co.uk assumed you wanted english
- 3) Clicking the link assumed you wanted the pretty html page representing Albert Einstein

So all of the application layer is hidden



In Spanish?

Albert Einstein - Wikipedia

en.wikipedia.org/wiki/Albert_Einstein

Create account Log in

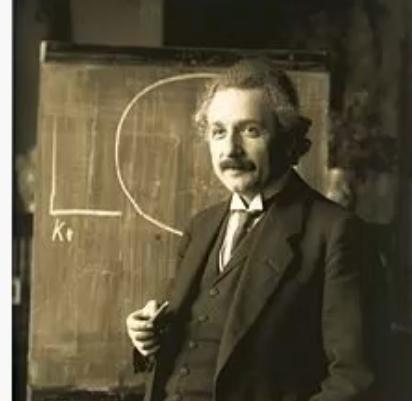
Article Talk Read View source View history Search

Albert Einstein

From Wikipedia, the free encyclopedia

"Einstein" redirects here. For other uses, see [Albert Einstein \(disambiguation\)](#) and [Einstein \(disambiguation\)](#).

Albert Einstein (/ælˈbɛrt ˈaɪnstaɪn/; German: [albɛrt ˈaɪnʃtaɪn] ([listen](#)); 14 March 1879 – 18 April 1955) was a German-born theoretical physicist. He developed the general theory of relativity, one of the two pillars of modern physics (alongside quantum mechanics).^{[2][3]} He is best known for his mass–energy equivalence formula $E = mc^2$ (which has been dubbed "the world's most famous equation").^[4] He received the 1921 Nobel Prize in Physics "for his services to theoretical physics, and especially for his discovery of the law of the photoelectric effect".^[5] The latter was pivotal in establishing quantum theory.



Albert Einstein

CC BY SA

ODI

So what did we need to do?

Search on the page and hope!

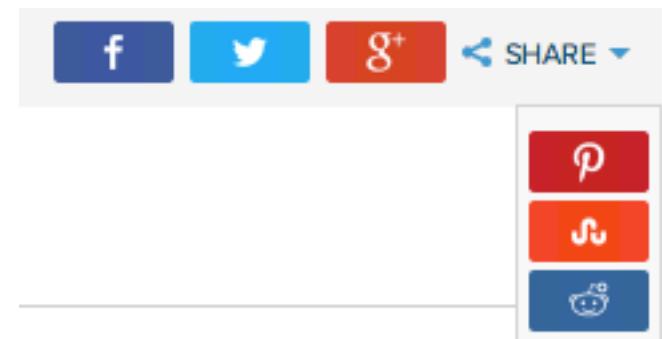
Common links

RSS Feed 

Social channels



Languages



Printable version



Printed version

Albert Einstein – Wikipedia

es.wikipedia.org/wiki/Albert_Einstein

Crear una cuenta Iniciar sesión

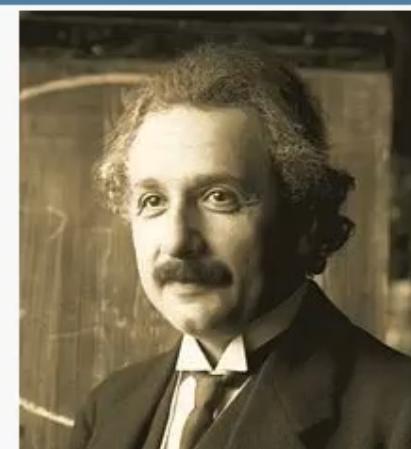
Artículo Discusión Leer Editar Ver historial Buscar

Albert Einstein

Para otros usos de este término, véase [Einstein \(desambiguación\)](#).

Albert Einstein (en alemán ['albet 'ainʃtaɪn]; Ulm, Imperio alemán, 14 de marzo de 1879 - Princeton, Estados Unidos, 18 de abril de 1955) fue un físico alemán de origen judío, nacionalizado después suizo y estadounidense. Es considerado como el científico más importante del siglo XX. Manuel Alfonseca cuantifica la importancia de 1000 científicos de todos los tiempos y, en una escala de 1 a 8, Einstein y Freud son los únicos del siglo XX en alcanzar la máxima puntuación;¹ asimismo califica a Einstein como «el científico más popular y conocido del siglo XX».²

En 1905, cuando era un joven físico desconocido, empleado en la Oficina de Patentes de Berna, publicó su



Albert Einstein

WIKIPEDIA
La enciclopedia libre

Portada
Portal de la comunidad
Actualidad
Cambios recientes
Páginas nuevas
Página aleatoria
Ayuda
Donaciones
Notificar un error

▼ Imprimir/exportar
Crear un libro
Descargar como PDF
Versión para imprimir

► Herramientas

▼ Otros proyectos



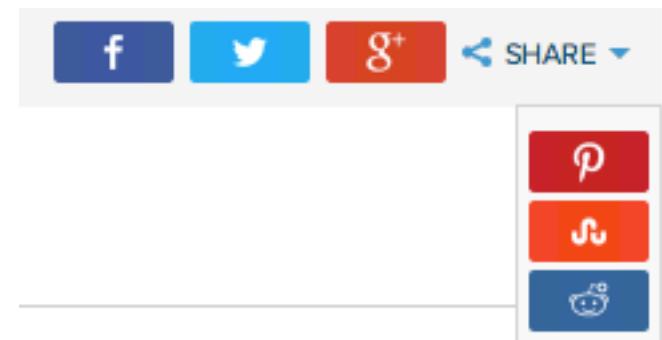
Common links

RSS Feed 

Social channels



Languages



Printable version



How a machine does it

Postman Albert Einstein - Wikipedia

en.wikipedia.org/wiki/Albert_Einstein

Create account Log in

Article Talk Read View source View history Search

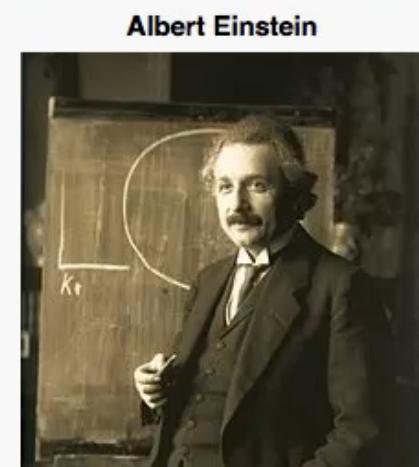
Albert Einstein

From Wikipedia, the free encyclopedia

"Einstein" redirects here. For other uses, see [Albert Einstein \(disambiguation\)](#) and [Einstein \(disambiguation\)](#).

Albert Einstein (/ælbert ˈaɪnstaɪn/; German: [albɛt ˈaɪnʃtaɪn] (listen); 14 March 1879 – 18 April 1955) was a German-born theoretical physicist. He developed the general theory of relativity, one of the two pillars of modern physics (alongside quantum mechanics).^{[2][3]} He is best known for his mass–energy equivalence formula $E = mc^2$ (which has been dubbed "the world's most famous equation").^[4] He received the 1921 Nobel Prize in Physics "for his services to theoretical physics, and especially for his discovery of the law of the photoelectric effect".^[5] The latter was pivotal in establishing quantum theory.

Near the beginning of his career, Einstein thought that



Albert Einstein

A Web Request

GET / HTTP/1.1

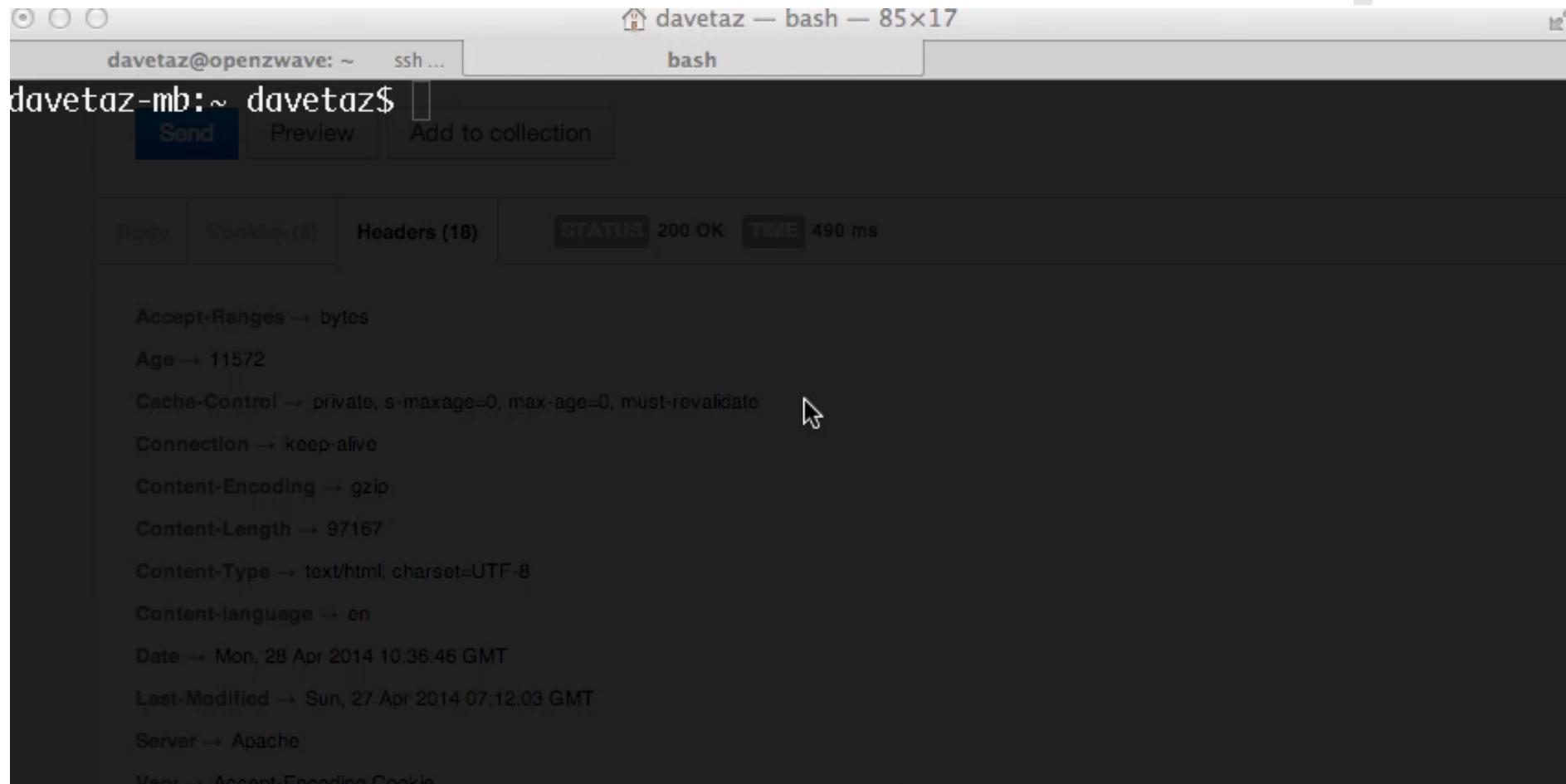


http://en.wikipedia.org/wiki/Albert_Einstein

```
telnet en.wikipedia.org 80
```

```
> GET /wiki/Albert_Einstein HTTP/1.1
> Host: en.wikipedia.org
```

A Web Request



A screenshot of a terminal window titled "davetaz — bash — 85x17". The window shows a command-line interface with a dark background. At the top, there are tabs for "davetaz@openzwave: ~" and "ssh ...". Below the tabs are three buttons: "Send", "Preview", and "Add to collection". The main area displays a web request response:

```
davetaz-mb:~ davetaz$ [REDACTED]
[REDACTED] Send Preview Add to collection
[REDACTED]
Body Cookies (0) Headers (10) STATUS 200 OK TIME 490 ms
[REDACTED]

Accept-Ranges → bytes
Age → 11572
Cache-Control → private; s-maxage=0, max-age=0, must-revalidate
Connection → keep-alive
Content-Encoding → gzip
Content-Length → 97167
Content-Type → text/html; charset=UTF-8
Content-language → en
Date → Mon, 28 Apr 2014 10:36:46 GMT
Last-Modified → Sun, 27 Apr 2014 07:12:03 GMT
Server → Apache
[REDACTED]
```

The "Headers (10)" tab is selected. A mouse cursor is visible over the "Connection" header.



Albert Einstein

From Wikipedia, the free encyclopedia

"Einstein" redirects here. For other uses, see [Albert Einstein \(disambiguation\)](#) and [Einstein \(disambiguation\)](#).

Albert Einstein (/*ælbərt ˈaɪnʃtæm*/; German: [albert ˈaɪnʃtaɪm] ([listen](#)); 14 March 1879 – 18 April 1955) was a German-born theoretical physicist. He developed the general theory of relativity, one of the two pillars of modern physics (alongside quantum mechanics).^{[2][3]} He is best known for his mass–energy equivalence formula $E = mc^2$ (which has been dubbed "the world's most famous equation").^[4] He received the 1921 Nobel Prize in Physics "for his services to theoretical physics, and especially for his discovery of the law of the photoelectric effect".^[5] The latter was pivotal in establishing quantum theory.

Near the beginning of his career, Einstein thought that

```
davetaz@openzwave: ~ ssh ... bash davetaz$ [REDACTED]
Send Preview Add to collection

[REDACTED] Headers (18) STATUS 200 OK TIME 490 ms

Accept-Ranges → bytes
Age → 11572
Cache-Control → private, s-maxage=0, max-age=0, must-revalidate
Connection → keep-alive
Content-Encoding → gzip
Content-Length → 97167
Content-Type → text/html; charset=UTF-8
Content-Language → en
Date → Mon, 28 Apr 2014 10:36:46 GMT
Last-Modified → Sun, 27 Apr 2014 07:12:03 GMT
Server → Apache
[REDACTED]
```

The headers define the properties of an HTTP transaction.

Headers

The screenshot shows the Postman application interface. At the top, there's a toolbar with icons for file operations, a search bar containing 'Albert Einstein - Wikipedia', and several status indicators. Below the toolbar, tabs for 'Normal', 'Basic Auth', 'Digest Auth', 'OAuth 1.0', and 'No environment' are visible, with 'No environment' being the active tab. The main area shows a GET request to 'http://en.wikipedia.org/wiki/Albert_Einstein'. Below the URL, there are buttons for 'URL params' and 'Headers (0)'. A table for setting headers is present, with columns for 'Header' and 'Value', and a 'Manage presets' button. At the bottom of the request section are buttons for 'Send' (highlighted in blue), 'Preview', 'Add to collection', and 'Reset'. Below the request area, a status summary shows 'Body', 'Cookies (6)', 'Headers (18)', 'STATUS 200 OK', and 'TIME 428 ms'. At the bottom of the interface, there are buttons for 'Pretty', 'Raw', 'Preview', 'JSON', and 'XML', followed by a code editor window displaying the HTML response from Wikipedia. The code editor shows lines 1 through 13 of the HTML document, including meta tags for charset, title, and various links.

```
1 <!DOCTYPE html>
2 <html lang="en" dir="ltr" class="client-nojs">
3   <head>
4     <meta charset="UTF-8" />
5     <title>Albert Einstein - Wikipedia, the free encyclopedia</title>
6     <meta http-equiv="X-UA-Compatible" content="IE=EDGE" />
7     <meta name="generator" content="MediaWiki 1.24wmf1" />
8     <link rel="alternate" href="android-app://org.wikipedia/http/en.m.wikipedia.org/wiki/Albert_Einstein" />
9     <link rel="apple-touch-icon" href="//bits.wikimedia.org/apple-touch/wikipedia.png" />
10    <link rel="shortcut icon" href="//bits.wikimedia.org/favicon/wikipedia.ico" />
11    <link rel="search" type="application/opensearchdescription+xml" href="/w/opensearch_desc.php" title="Wikipedia
(en)" />
12    <link rel="EditURI" type="application/rsd+xml" href="//en.wikipedia.org/w/api.php?action=rsd" />
13    <link rel="copyright" href="//creativecommons.org/licenses/by-sa/3.0/" />
```



How a machine does it

I have an address (don't care about it being a URI or URL)

I would like a different version:

- Accept:  application/rss+xml
- Accept-Language:  es-es

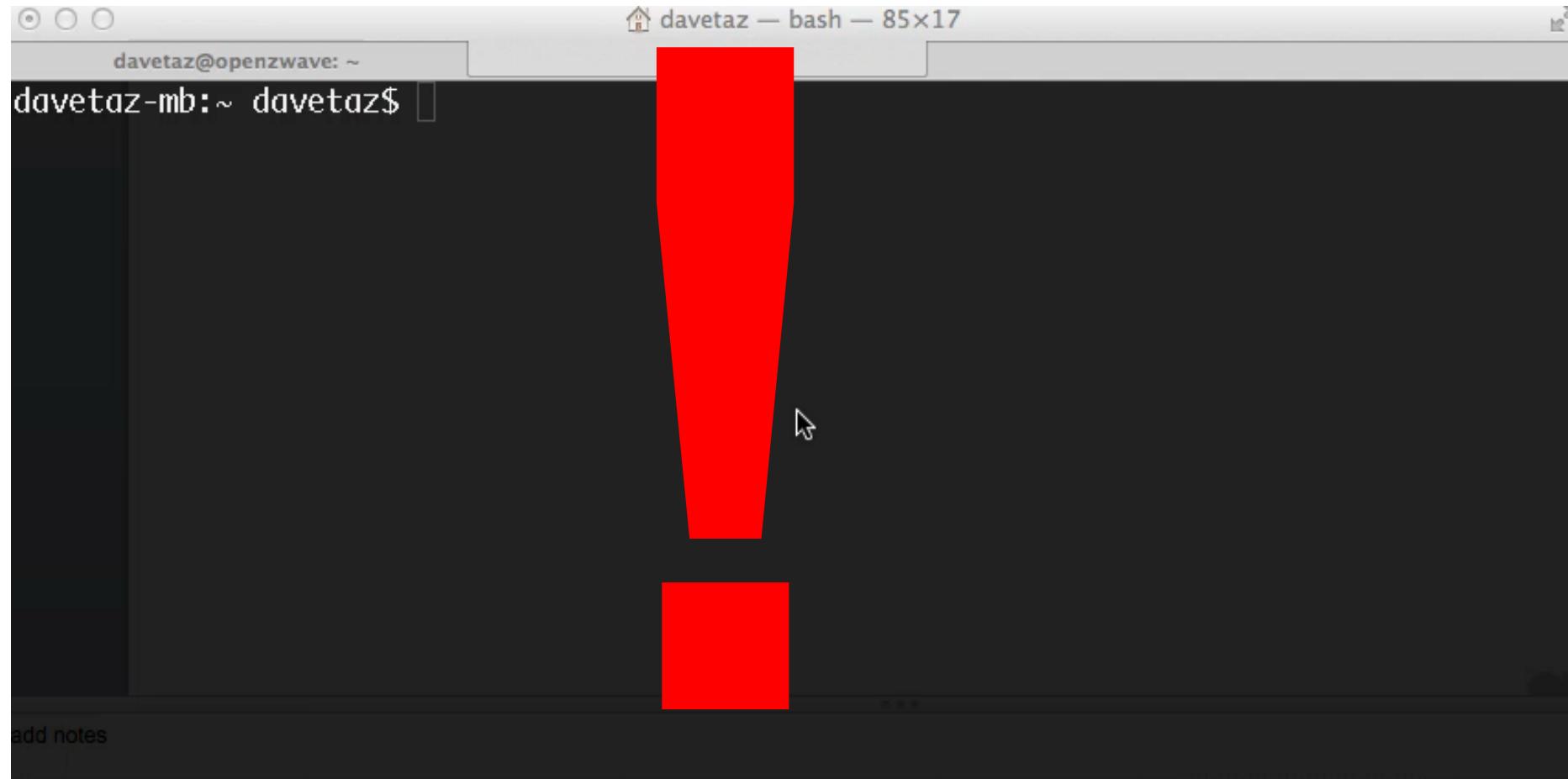
Spanish please

The screenshot shows the Postman application interface. At the top, there's a header bar with tabs for 'Normal', 'Basic Auth', 'Digest Auth', 'OAuth 1.0', and 'No environment'. Below the header, the URL is set to 'http://en.wikipedia.org/wiki/Albert_Einstein' and the method is 'GET'. There are buttons for 'URL params' and 'Headers (0)'. Under the URL input, there's a table for setting headers with columns 'Header' and 'Value', and a 'Manage presets' button. Below the table are buttons for 'Send' (highlighted in blue), 'Preview', and 'Add to collection', and a red 'Reset' button. The status bar at the bottom shows 'STATUS 200 OK' and 'TIME 474 ms'. The main body area displays the raw HTML response from the Wikipedia page. The footer of the Postman window includes a 'Body' tab, 'Cookies (6)', 'Headers (18)', and a large 'cc BY SA' logo.

```
1 <!DOCTYPE html>
2 <html lang="en" dir="ltr" class="client-nojs">
3   <head>
4     <meta charset="UTF-8" />
5     <title>Albert Einstein - Wikipedia, the free encyclopedia</title>
6     <meta http-equiv="X-UA-Compatible" content="IE=EDGE" />
7     <meta name="generator" content="MediaWiki 1.24wmf1" />
8     <link rel="alternate" href="android-app://org.wikipedia/http/en.m.wikipedia.org/wiki/Albert_Einstein" />
9     <link rel="apple-touch-icon" href="//bits.wikimedia.org/apple-touch/wikipedia.png" />
10    <link rel="shortcut icon" href="//bits.wikimedia.org/favicon/wikipedia.ico" />
11    <link rel="search" type="application/opensearchdescription+xml" href="/w/opensearch_desc.php" title="Wikipedia
(en)" />
12    <link rel="EditURI" type="application/rsd+xml" href="//en.wikipedia.org/w/api.php?action=rsd" />
13    <link rel="copyright" href="//creativecommons.org/licenses/by-sa/3.0/" />
```



What happened?



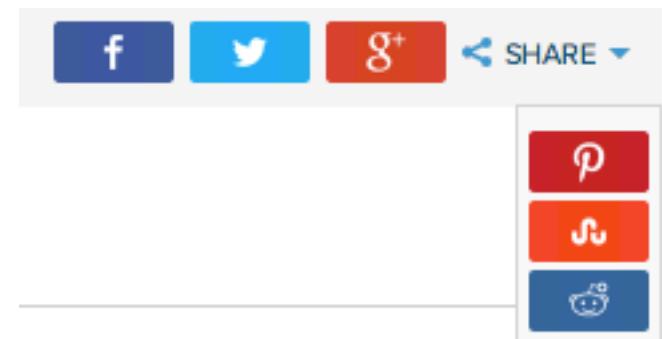
Common links

RSS Feed 

Social channels



Languages



Printable version



Error Codes

100: Go

200: Got it

300: Not me

400: Your problem

500: Maybe it's my problem





application/atom+xml

Try again

Postman Albert Einstein - Wikipedia

Normal Basic Auth Digest Auth OAuth 1.0 No environment ▾

http://www.wikipedia.org/wiki/Albert_Einstein GET URL params Headers (0)

Header Value Manage presets

Send Preview Add to collection Reset

Body Cookies (1) Headers (18) STATUS 200 OK TIME 517 ms

Pretty Raw Preview JSON XML

```
1 <!DOCTYPE html>
2 <html lang="en" dir="ltr" class="client-nojs">
3   <head>
4     <meta charset="UTF-8" />
5     <title>Albert Einstein - Wikipedia, the free encyclopedia</title>
6     <meta http-equiv="X-UA-Compatible" content="IE=EDGE" />
7     <meta name="generator" content="MediaWiki 1.24wmf1" />
8     <link rel="alternate" href="android-app://org.wikipedia/http/en.m.wikipedia.org/wiki/Albert_Einstein" />
9     <link rel="apple-touch-icon" href="//bits.wikimedia.org/apple-touch/wikipedia.png" />
10    <link rel="shortcut icon" href="//bits.wikimedia.org/favicon/wikipedia.ico" />
11    <link rel="search" type="application/opensearchdescription+xml" href="/w/opensearch_desc.php" title="Wikipedia
(en)" />
12    <link rel="EditURI" type="application/rsd+xml" href="//en.wikipedia.org/w/api.php?action=rsd" />
13    <link rel="copyright" href="//creativecommons.org/licenses/by-sa/3.0/" />
```

CC BY SA

ODI



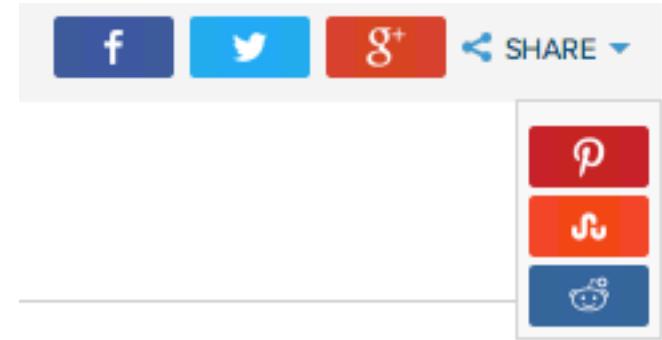
application/atom+xml

A screenshot of a macOS terminal window titled "davetaz — bash — 85x17". The title bar also shows "davetaz@openzwave: ~" and "ssh ...". The main pane contains the command "davetaz-mb:~ davetaz\$ [redacted]" followed by several large red rectangular redactions. The bottom left corner of the window has the text "add notes".

Common links



Social channels



Languages



Printable version



So what do you have?

The screenshot shows the Postman application interface. At the top, there's a toolbar with tabs for 'Normal', 'Basic Auth', 'Digest Auth', 'OAuth 1.0', and 'No environment'. Below the toolbar, the URL is set to 'http://www.wikipedia.org/wiki/Albert_Einstein' with a 'GET' method selected. There are buttons for 'URL params' and 'Headers (0)'. A 'Header' section is present with a 'Value' field and a 'Manage presets' button. At the bottom of the header area are buttons for 'Send' (highlighted in blue), 'Preview', 'Add to collection', and 'Reset'. Below the header, there are tabs for 'Body', 'Cookies (1)', and 'Headers (18)'. The 'STATUS' tab shows '200 OK' and 'TIME' '523 ms'. The main content area displays the raw HTML response from Wikipedia. The HTML code starts with the DOCTYPE declaration and includes meta tags for charset, title, and generator, along with links for alternate, apple-touch-icon, shortcut icon, and search resources. The footer of the page contains the CC-BY-SA license logo and the ODI logo.

```
1 <!DOCTYPE html>
2 <html lang="en" dir="ltr" class="client-nojs">
3   <head>
4     <meta charset="UTF-8" />
5     <title>Albert Einstein - Wikipedia, the free encyclopedia</title>
6     <meta http-equiv="X-UA-Compatible" content="IE=EDGE" />
7     <meta name="generator" content="MediaWiki 1.24wmf1" />
8     <link rel="alternate" href="android-app://org.wikipedia/http/en.m.wikipedia.org/wiki/Albert_Einstein" />
9     <link rel="apple-touch-icon" href="//bits.wikimedia.org/apple-touch/wikipedia.png" />
10    <link rel="shortcut icon" href="//bits.wikimedia.org/favicon/wikipedia.ico" />
11    <link rel="search" type="application/opensearchdescription+xml" href="/w/opensearch_desc.php" title="Wikipedia
(en)" />
12    <link rel="EditURI" type="application/rsd+xml" href="//en.wikipedia.org/w/api.php?action=rsd" />
13    <link rel="copyright" href="//creativecommons.org/licenses/by-sa/3.0/" />
```

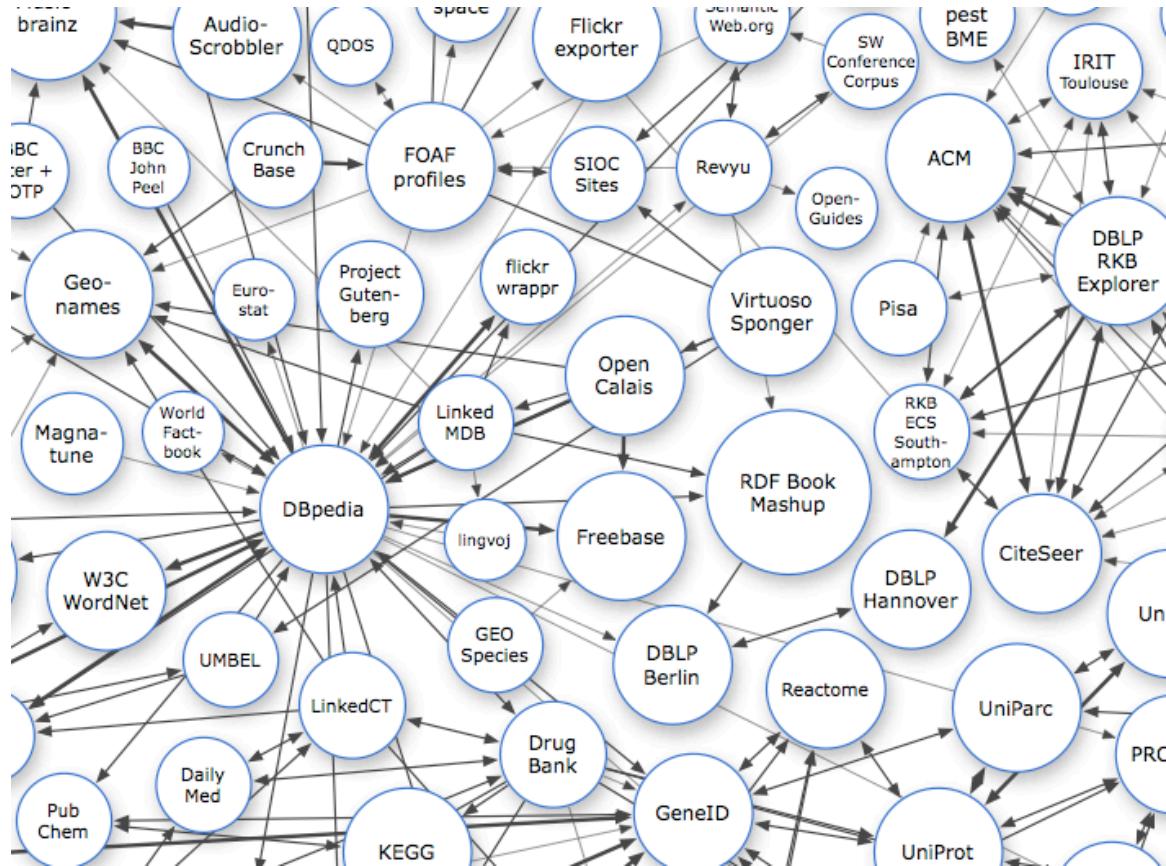


The <link rel=...> tag

So who and what is the <link rel=...> tag for:

1. To stop the number of HTTP headers forever expanding?
2. To add custom headers? (Even though that is what X-* headers are)
3. Should machines have to search all the possible link-rel headers related to a resource and other links.
(recurse, recurse, recurse)

It's not all doom and gloom



The data version of wikipedia,
available in a machine friendly way.

Wikipedia & dbpedia

URIS



www.wikipedia.org/wiki/Albert_Einstein



http://dbpedia.org/resource/Albert_Einstein



de.wikipedia.org/wiki/Albert_Einstein



en.wikipedia.org/wiki/Albert_Einstein



es.wikipedia.org/wiki/Albert_Einstein

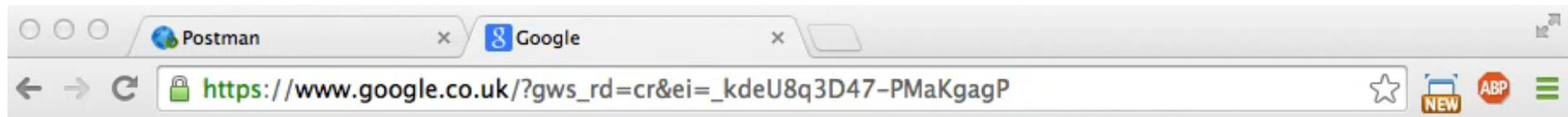
URIS



www.wikipedia.org/wiki/Albert_Einstein



http://dbpedia.org/resource/Albert_Einstein



+David Mail Images Share



Google Search

I'm Feeling Lucky

Advertising Business About

Updated Privacy & Terms Settings Use Google



davetaz@openzwave: ~ ssh ...

bash

bash

davetaz-mb:~ davetaz\$



es.wikipedia.org/wiki/Albert_Einstein

URIS



www.wikipedia.org/wiki/Albert_Einstein



http://dbpedia.org/resource/Albert_Einstein

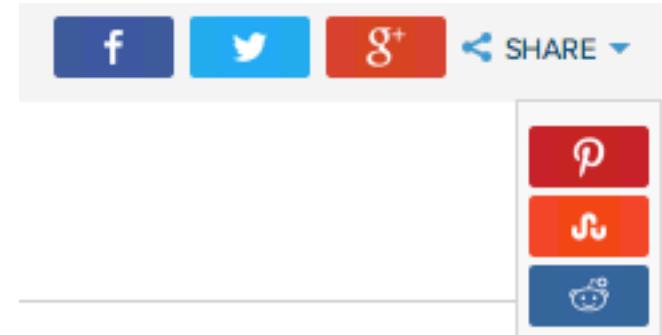


add notes

Common links



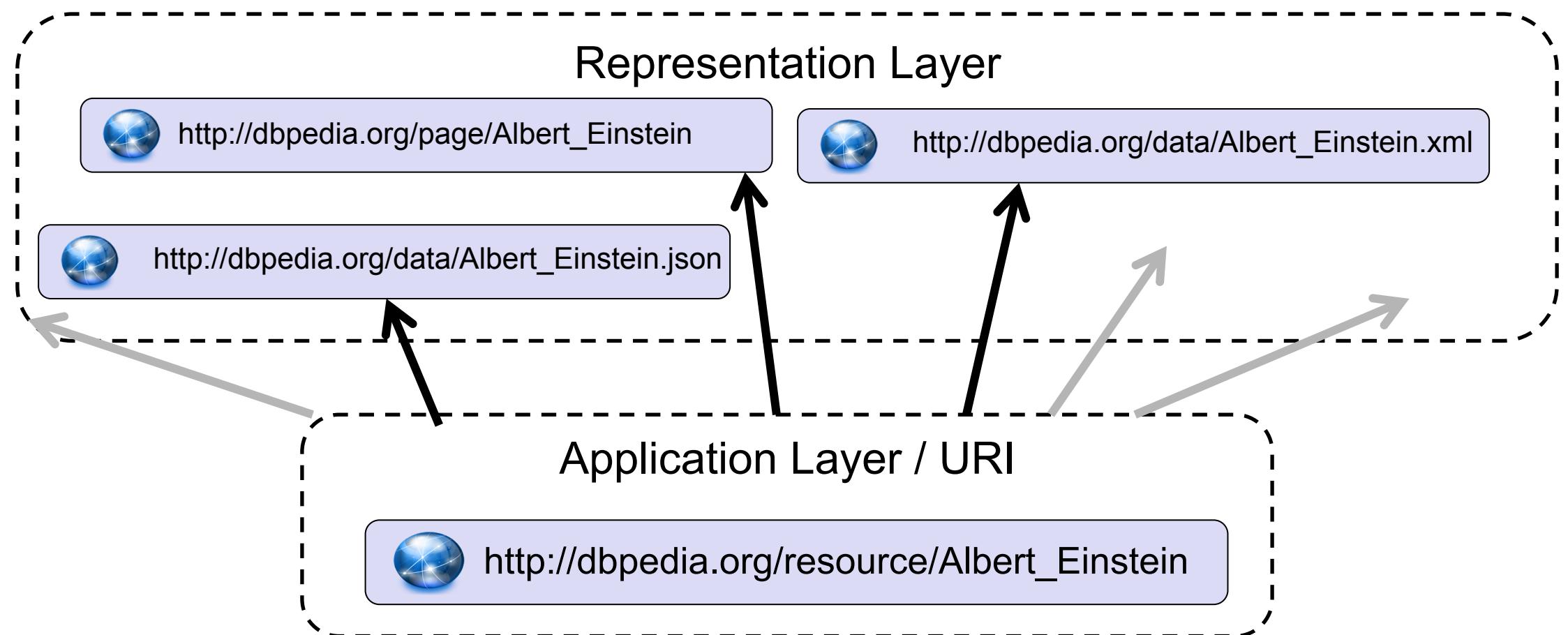
Social channels



Languages



URL, URI, UR What!?!



The HTTP 3XX codes redirect

303 hell



Ask for a URI (application layer) and get redirected to the correct representation.

What should happen when you ask for a different version of a representation? 404? 406? 303?

HTTP Range-14

★★★★★ - Use HTTP URIs to identify things and when people look up those URIs on the web, provide useful information and data.

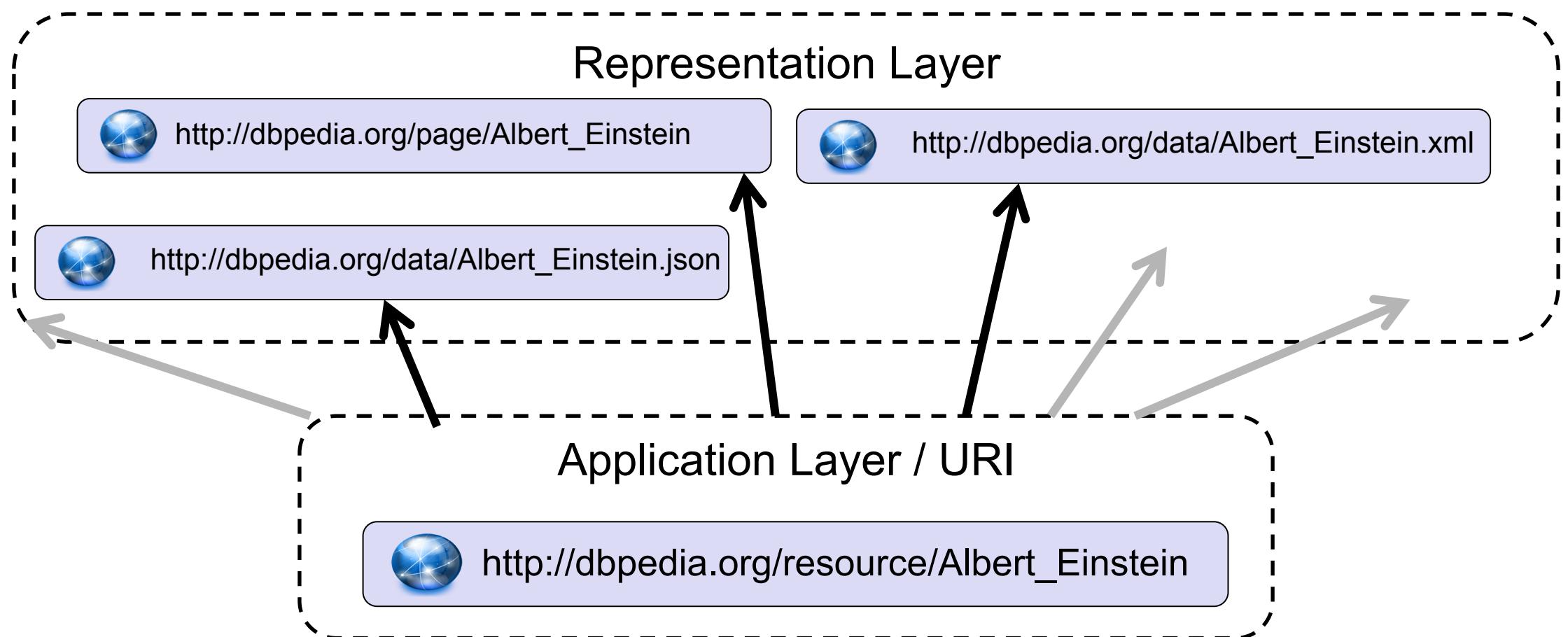
Identifier for the person Albert Einstein.



http://dbpedia.org/resource/Albert_Einstein

You cannot download a person, even if they are alive.

Use 303



Which one is the URI?



http://dbpedia.org/page/Albert_Einstein



http://dbpedia.org/data/Albert_Einstein.xml



http://dbpedia.org/resource/Albert_Einstein



http://dbpedia.org/data/Albert_Einstein.json

Questions

- Can the URL and URI ever be the same?
 - What if I do want an HTML representation of an HTML representation?
 - What if I do want to describe a mistake in the HTML representation?
- Should we see browsers change URIs/URLs?



Questions

We need better semantics

This is a long-standing AI problem

Answers

Experts have been discussing HTTP-Range-14 problem
since 2002!

<https://www.w3.org/2001/tag/group/track/issues/14>

The original discussion is now closed but continues in
HTTP-Redirections-57

<https://www.w3.org/2001/tag/group/track/issues/57>

<http://www.ibiblio.org/hhalpin/homepage/notes/uri.html>



Current practices

URI



`http://www.bbc.co.uk/music/artists/d24fb461-dee8-41fc-bb15-2f13bb2644a6`

URLs

.html

.csv

.xml

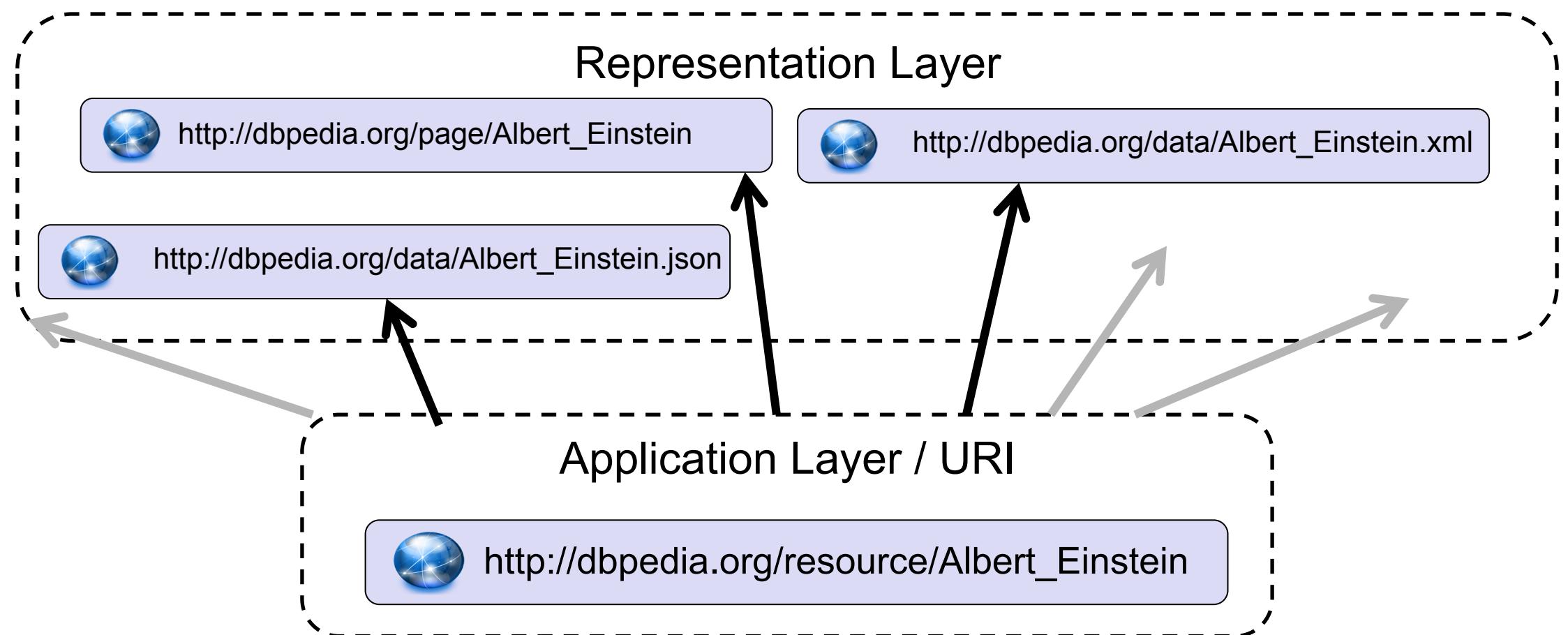
.json

.rdf

The BBC use a URN based system to build
URIs. Adding extensions gives you the URLs.

This way you can add an extension OR content
negotiate

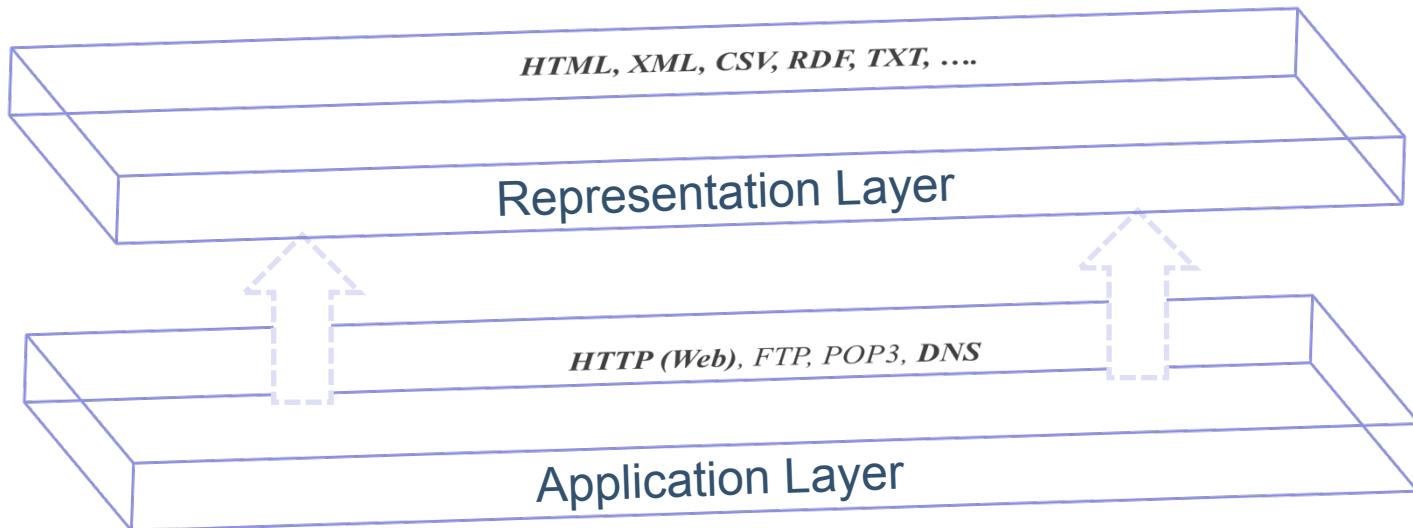
Current practice (2)



Recap



Representation Layer



UR What?

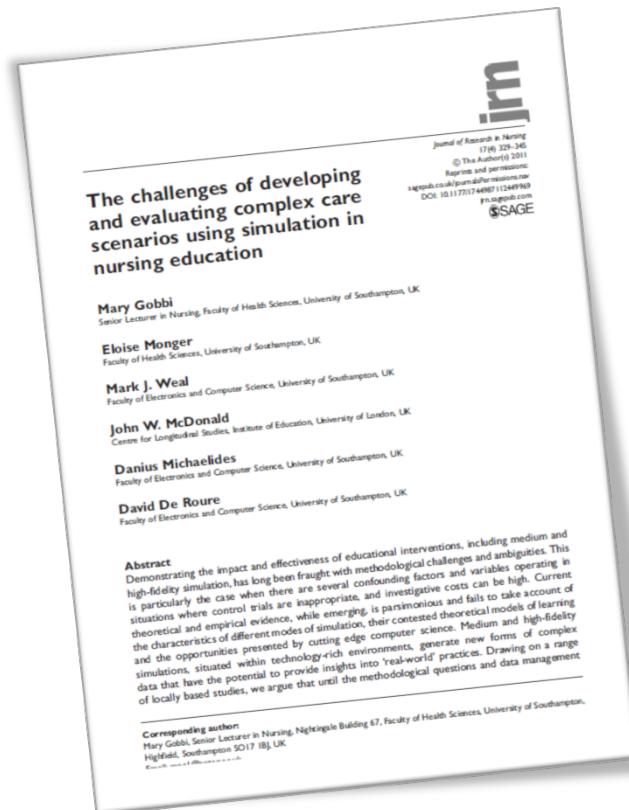
ISSN: 1744-988X

<http://eprints.soton.ac.uk/id/eprint/341927>

doi:10.1177/1744987112449969

<http://eprints.soton.ac.uk/341927/>

ISSN: 1361-4096



HTTP Get

GET / HTTP/1.1



<http://dbpedia.org/resource/Einstein>

```
telnet dbpedia.org 80
```

```
> GET /resource/Einstein HTTP/1.1
> Host: dbpedia.org
```

Headers

Accept-*

Accept: text/html

Accept-Charset: iso-8859-5

Accept-Encoding: compress, gzip

Accept-Language: da, en-gb; q=0.8, en;q=0.7

Accept-Ranges: bytes

Content-*

Content-Type: text/html

Content-Encoding: compress, gzip

Content-Language: da

Content-Ranges: bytes

Content-Length:

Content-MD5:

Content-Location:

Cache-

Authorization



Content Negotiation

Content negotiation is the single most important aspect of the web of data

Content negotiation is used to request a specific representation of a resource from the representation layer using the application layer URI.

Often this process will return a HTTP 303 redirect to the URL of the representation you are requesting.



<http://dbpedia.org/resource/Einstein>

Example

```
telnet dbpedia.org 80
```

```
> GET /resource/Einstein HTTP/1.1  
> Host: dbpedia.org  
> Accept: application/json
```

```
HTTP/1.1 303 See Other
```

```
Date: Thu, 24 Apr 2014 09:49:02 GMT  
Content-Type: application/json; qs=0.6  
Location: http://dbpedia.org/data/Einstein.json
```

Common errors

Many web servers do not have content negotiation enabled.

Many web sites allow humans to access different representations of a resource by adding a file extension (.json, .csv, .xml) etc.

Machines don't care about the URI OR extension, they use content negotiation.

The Future (is in the past)



The power of headers

Accept:  application/rss+xml

Accept-Language:  es

Accept-Datetime:  Thu, 31 May 2007 20:35:00 GMT



mementoweb.org

Demo

The screenshot shows a web browser window with the following details:

- Tab Bar:** Postman, New Tab, About: Albert Einstein.
- Address Bar:** www.math.wustl.edu
- User Interface Elements:** Back, Forward, Stop, Search, New Tab, ABP (Ad Blocker), Grid View, David's profile picture, Mail, Images, Notifications (1), Share, and a user icon.
- Content Area:** A large, colorful illustration of a town square featuring various buildings, a clock tower, a horse-drawn carriage, and people.
- Search Bar:** A search bar with a microphone icon.
- Thumbnail Preview Row:** Four small screenshots of other websites:
 - Open Data Institute - Calendar
 - ODI Tech Team Presentation
 - Lloyds Bank - Personal Banking
 - BBC News - Home



Why headers?

Say no to query parameters that control the representation. They are so very wrong!



[www.wikipedia.org/wiki/Albert_Einstein?
format=json&lang=en×tam](http://www.wikipedia.org/w/index.php?title=Albert_Einstein&oldid=200720353&format=json&lang=en×tamp=Thu%252C+31+May+2007+20%253A35%253A00+GMT)p=Thu%252C+31+May
+2007+20%253A35%253A00+GMT



[http://transportapi.com/v3/uk/public/journey/from/
postcode:EC2A+4JE/to/stop:Canary+wharf/at/
2013-10-18/15:29.json?not_modes=train](http://transportapi.com/v3/uk/public/journey/from/postcode:EC2A+4JE/to/stop:Canary+wharf/at/2013-10-18/15:29.json?not_modes=train)

Web APIs

more than just GET

- ✓ GET
- POST
- PUT
- PATCH
- DELETE
- COPY
- HEAD
- OPTIONS
- LINK
- UNLINK
- PURGE

Taking a REST

APIs are machine to machine interfaces

The Web has an API you can build on, it's called HTTP.

If you build an HTTP like API, or use HTTP as part of
your API you may have built a RESTful API.

Verbs

GET

Asks for a representation of a specified resource

ONLY for retrieve!



Verbs

HEAD

Identical to GET but don't send the content (payload), just the headers.

More Verbs

POST

Do something with the content I give you

What you do depends on the service, mostly



More Verbs

PUT

Create a new resource at **my defined** location

Do it or fail



More Verbs

DELETE

Delete the resource at the **URI specified**

Do it or fail



Lesser supported OPTIONS

Tell me the HTTP methods supported on this URI

Lesser supported PATCH

Partially modify a resource between the given boundaries

Lesser supported TRACE

echo back the request so I can see if there are any changes made in the middle

Safe methods

Safe methods

GET

HEAD

OPTIONS

TRACE

Destructive methods

PUT

POST

DELETE

PATCH

REST and CRUD

REpresentational State Transfer is the generic method by which resources can be exchanged between two agents.

Create Retrieve Update Delete is explicitly about API capability and sounds better than PGPPD (Put, Get, Post/Patch, Delete)

Error Codes

Q: Can I do this? (POST/PUT)

A: Yes (1XX) or No (4XX)

Q: OK do it! (POST/PUT)

A: Done (2XX) or Error (4XX,5XX)

Error Codes

Q: Get a resource!

A: It's over there (3XX)

Q: OK, get that then

A: Sure (200)

Nursery Rhymes



Mary, Mary, quite contrary,
How does your garden grow?
With silver bells and cockle shells
And pretty maids all in a row

Nursery Rhymes

TimBL, TimBL, very nimble,
How does your data web grow?
With URLs and HTMLs
And GET and POSTs all in a row

