



# Introduction to the Linked Data Platform (LDP)

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# Agenda

- What is the Linked Data Platform (LDP)
- Basic definitions of concepts and rules
- Examples
- Why this is important
- Q&A

# Related Sessions

- **Linked data, URIs, and labels** by Trey Terrel
- **Introducing Hydra-works: PCDM in Hydra** by Lynette Rayle

# Linked Data

First introduced by Tim Berners-Lee in 2006

**"The Semantic Web isn't just about putting data on the web. It is about making links, so that a person or machine can explore the web of data"**

- Identify things with valid URLs
- Use standards for representation
- Include other URLs in your data

See <http://www.w3.org/DesignIssues/LinkedData.html>

https://en.wikipedia.org/wiki/Abraham\_Lincoln

The Wikipedia logo is visible in the top left corner. The page title is "Abraham Lincoln". The main content starts with a brief introduction: "This article is about the American president. For other uses, see [Abraham Lincoln \(disambiguation\)](#)".

**Abraham Lincoln**

From Wikipedia, the free encyclopedia

**Summary**

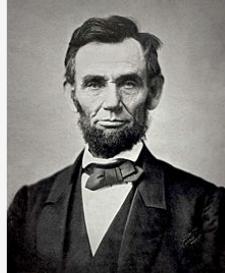
**Abraham Lincoln** (February 12, 1809 – April 15, 1865) was the 16th President of the United States, serving from March 1861 until his assassination in April 1865. Lincoln led the United States through its Civil War—its bloodiest war and its greatest moral, constitutional, and political crisis.<sup>[1][2]</sup> In doing so, he preserved the Union, abolished slavery, strengthened the federal government, and modernized the economy.

Born in Hodgenville, Kentucky, Lincoln grew up on the western frontier in Kentucky and Indiana. Largely self-educated, he became a lawyer in Illinois, a Whig Party leader, and a member of the Illinois House of Representatives, where he served from 1834 to 1846. Elected to the United States House of Representatives in 1846, Lincoln promoted rapid modernization of the economy through banks, tariffs, and railroads. Because he had originally agreed not to run for a second term in Congress, and because his opposition to the Mexican–American War was unpopular among Illinois voters, Lincoln returned to Springfield and resumed his successful law practice. Reentering politics in 1854, he became a leader in building the new Republican Party, which had a statewide majority in Illinois. In 1858, while taking part in a series of highly publicized debates with his opponent and rival, Democrat Stephen A. Douglas, Lincoln spoke out against the expansion of slavery, but lost the U.S. Senate race to Douglas.

In 1860, Lincoln secured the Republican Party presidential nomination as a moderate from a swing state. With very little support in the slaveholding states of the South, he swept the North and was elected president in 1860. His victory prompted seven southern slave states to form the Confederate States of America before he moved into the White House - no compromise or reconciliation was found regarding slavery and secession. Subsequently, on April 12, 1861, a Confederate attack on Fort Sumter inspired the North to enthusiastically rally behind the Union in a declaration of war. As the leader of the moderate faction of the Republican Party, Lincoln confronted Radical Republicans, who demanded harsher treatment of the South, War Democrats, who called for more compromise, anti-war Democrats (called Copperheads), who despised him, and irreconcilable secessionists, who plotted his assassination. Politically, Lincoln fought back by pitting his opponents against each other, by carefully planned political patronage, and by appealing to the American people with his powers of oratory.<sup>[3]</sup> His Gettysburg Address became an iconic endorsement of the principles of nationalism, republicanism, equal rights, liberty, and democracy.

Lincoln initially concentrated on the military and political dimensions of the war. His primary goal was to reunite the nation. He suspended *habeas corpus*, leading to the controversial *ex parte Merryman* decision, and he averted potential British intervention in the war by defusing the Trent Affair in late 1861. Lincoln closely supervised the war

**Abraham Lincoln**



Lincoln in 1863 at the age of 54

**16th President of the United States**

In office  
March 4, 1861 – April 15, 1865

Vice President Hannibal Hamlin (1861–1865)  
Andrew Johnson (1865)

Preceded by James Buchanan

Succeeded by Andrew Johnson

**Member of the U.S. House of Representatives from Illinois's 7th district**

In office  
March 4, 1847 – March 4, 1849

Preceded by John Henry

Succeeded by Thomas Harris

**Member of the Illinois House of Representatives**

In office  
1834–1842

**Personal details**

**Born** February 12, 1809  
Hodgenville, Kentucky, U.S.

**Died** April 15, 1865 (aged 56)  
Petersen House,  
Washington, D.C., U.S.



Birth place

[https://en.wikipedia.org/wiki/Abraham\\_Lincoln](https://en.wikipedia.org/wiki/Abraham_Lincoln)

# Linked Data

```
Abraham_Lincoln    label          "Abraham Lincoln" .  
Abraham_Lincoln    birthDate      "1809-02-12" .  
Abraham_Lincoln    profession    "Lawyer" .  
[ . . . ]  
Abraham_Lincoln    birthPlace    Hodgenville,_Kentucky .
```

[http://dbpedia.org/resource/Abraham\\_Lincoln](http://dbpedia.org/resource/Abraham_Lincoln)

[http://dbpedia.org/resource/Hodgenville,\\_Kentucky](http://dbpedia.org/resource/Hodgenville,_Kentucky)

[http://dbpedia.org/data/Abraham\\_Lincoln.n3](http://dbpedia.org/data/Abraham_Lincoln.n3)

# RDF 101

- Resource Description Framework

<http://www.w3.org/TR/rdf-primer/>

- Data expressed in triples

`<subject> <predicate> <object>`

- For example

`<hydraconnect> <location> "Minneapolis"`

`<hydraconnect> <date> "2015-09-22"`

# From read-only to read-write

- How are we supposed to **update Linked Data**
- Intuitively we assume that we must use HTTP  
GET/POST and Resource Description  
Framework (RDF)...
- ...but what are the mechanics, the rules, how  
do we deal with containership

# Linked Data Platform (LDP)

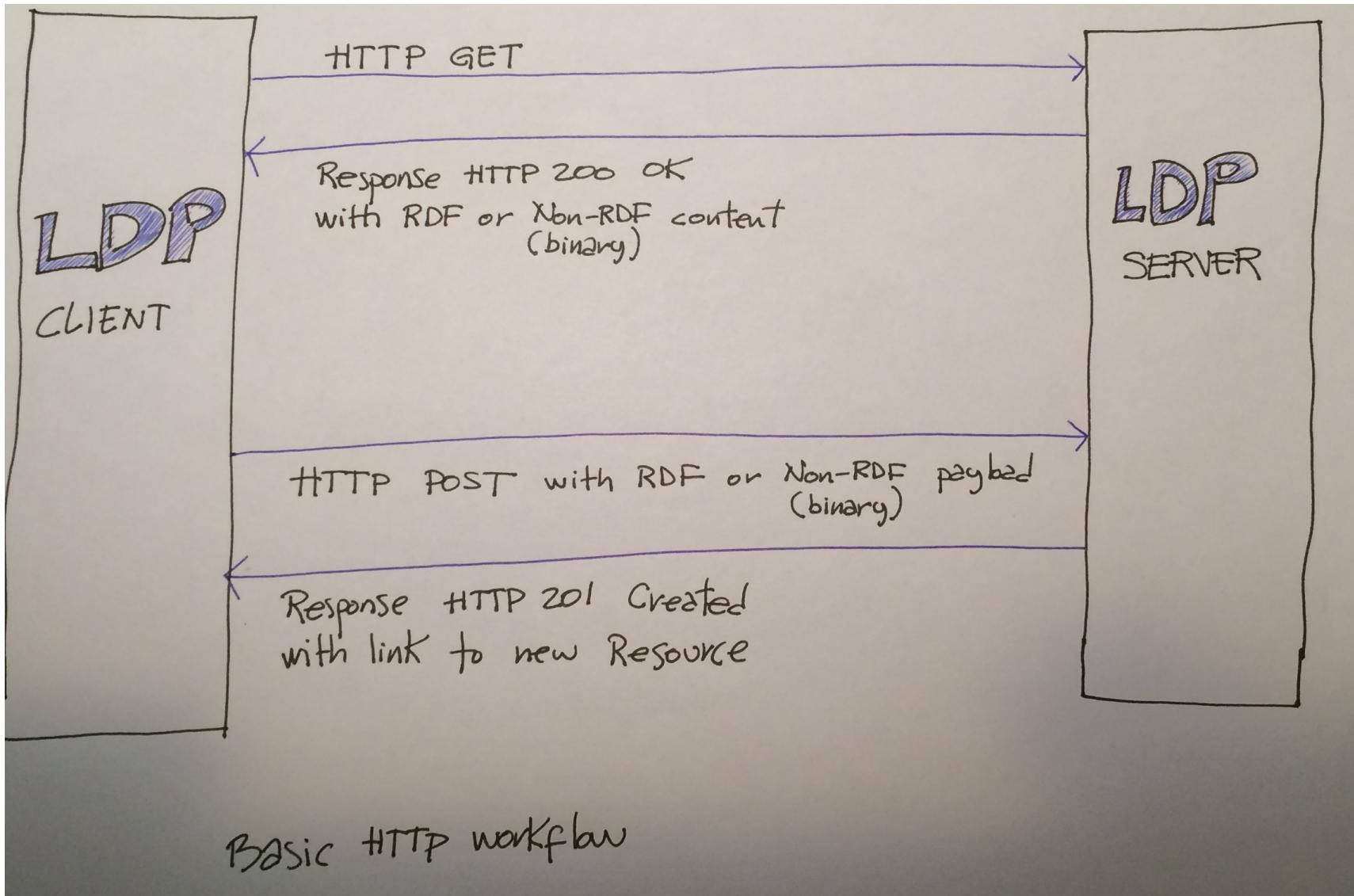
“defines a set of rules for HTTP operations on web resources, some based on RDF, to provide an architecture for **read-write** Linked Data on the web” <http://www.w3.org/TR/ldp/>

W3C Recommendation as of Feb/2015

Linked Data Platform (LDP)  
is an HTTP API for  
read-write Linked Data

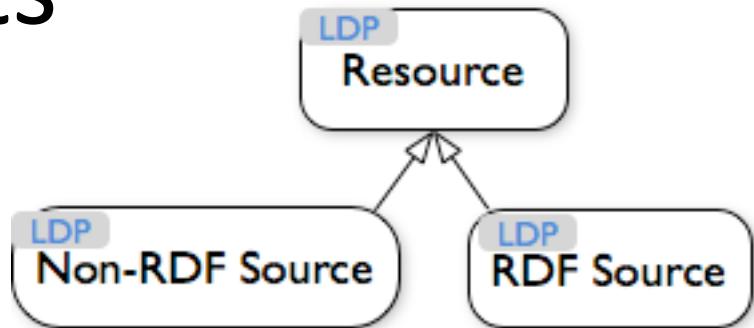
API stands for Application Programming Interface.  
An API defines the rules to communicate with a program.

# Basic HTTP workflow



# Concepts

- **Everything is a Resource**
- **RDF Sources:** expressed in Resource Description Framework (triples)
- **Non-RDF Sources:** everything else (web pages, PDFs, image/audio/video files, binaries, et cetera)



# Create a New RDF Source

## HTTP request

POST localhost/

Slug: **hydraconnect2015**

HTTP POST to create a  
new RDF Source  
(**hydraconnect2015**)

<> dcterms:title "Hydra Connect 2015".

<> dcterms:subject "Hydra conference in Minneapolis".

Triples for the  
new resource

## HTTP response

HTTP/1.1 201 Created

Location: <http://localhost/hydraconnect2015/>

Yup, created...

...and here is the URL of  
the new resource

# Fetch an Existing RDF Source

**Client makes HTTP request**

GET localhost/**hydraconnect2015**

HTTP GET request

**Server returns HTTP response**

HTTP/1.1 200 OK

Content-Type: text/turtle

Link: <<http://www.w3.org/ns/ldp#BasicContainer>>; rel="type",  
<<http://www.w3.org/ns/ldp#Resource>>; rel="type"

RDF source that  
is a container

@prefix dcterms: <<http://purl.org/dc/terms/>>.

@prefix ldp: <<http://www.w3.org/ns/ldp#>>.

<localhost/**hydraconnect2015**> a ldp:BasicContainer ;  
dc:title "Hydra Connect 2015" ;  
dc:subject ""Hydra conference in Minneapolis" .

HTTP Headers

HTTP Body

# Create a New Non-RDF Source

## HTTP request

POST localhost/

Slug: logo.jpg

**Content-Type: image/jpeg**

Content-Length: 1020

[binary of the image goes here]

HTTP POST to create  
a new Non-RDF Source

Binary data

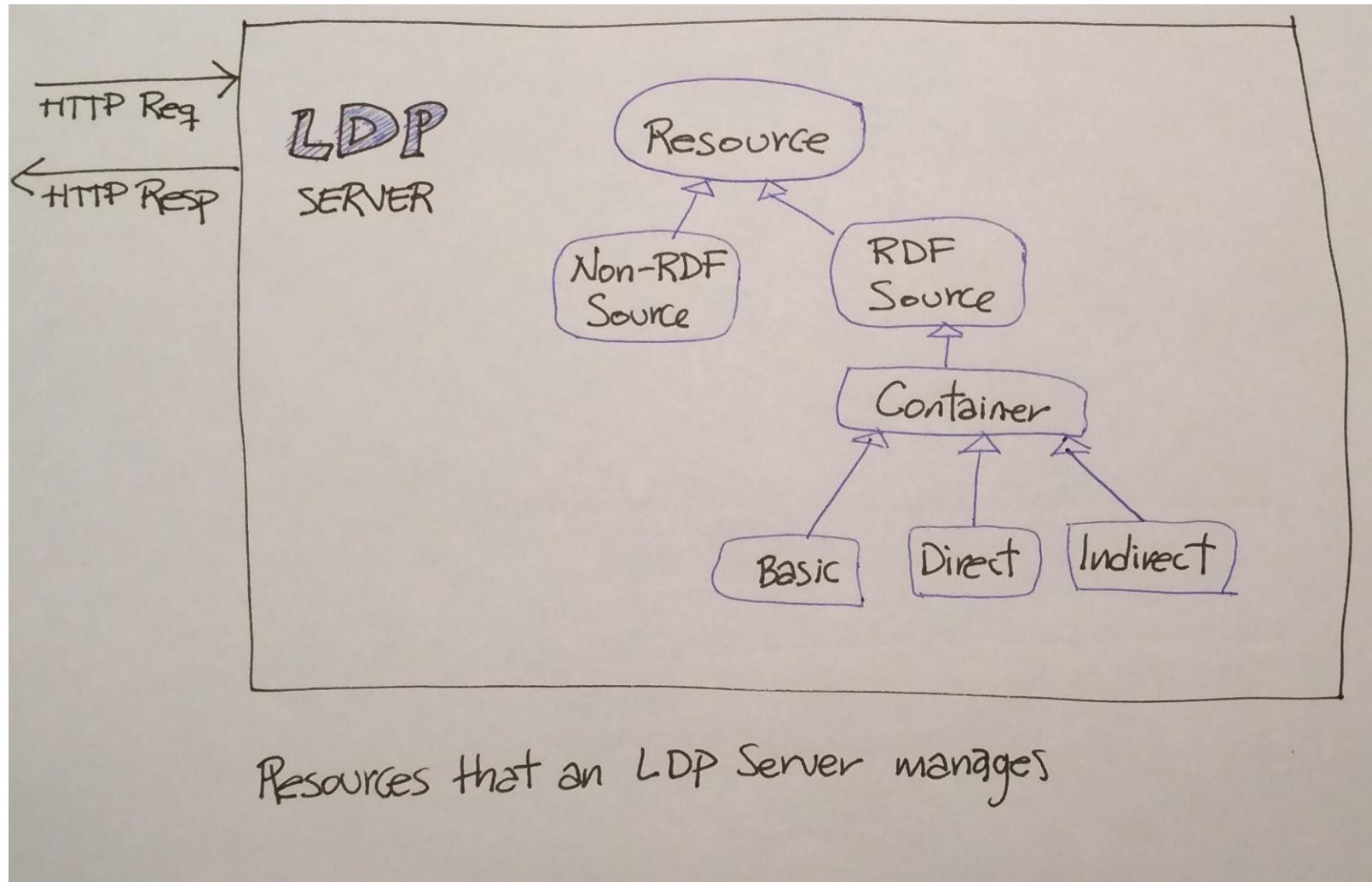
## HTTP response

HTTP/1.1 201 Created

Location: http://localhost/logo.jpg

...and here is the URL of  
the new resource

# Concepts (expanded)



# Adding an RDF Source to a Basic Container (1/2)

## **HTTP request**

POST localhost/hydraconnect2015/

Slug: **session1**

POST to Basic Container



<> dcterms:title "Welcome to Hydra Connect 2015".

<> dcterms:subject "blah blah".

## **HTTP response**

HTTP/1.1 201 Created

Location: http://localhost/hydraconnect2015/**session1**

# Adding an RDF Source to a Basic Container (2/2)

## HTTP request

```
GET localhost/hydraconnect2015/ HTTP/1.1
```

Fetch the Basic Container  


## HTTP response

```
[the usual HTTP headers go here]
```

```
<localhost/hydraconnect2015/> a ldp:BasicContainer ;  
    dc:title "Hydra Connect 2015" ;  
    dc:subject {"Hydra conference in Minneapolis"} ;  
    ldp:contains <localhost/hydraconnect2015/session1> .
```

New triple automatically  
added by the LDP Server  


# Direct Containers (1/2)

## HTTP request

POST localhost/ HTTP/1.1

Create Direct Container

Slug: **speakers**

```
<> dc:title "People that speaks at conferences".  
<> rdf:DirectContainer .  
<> ldp:membershipResource <localhost/hydraconnect2015> .  
<> ldp:hasMemberRelation hasSpeaker .
```

Containership

## HTTP request

POST localhost/**speakers** HTTP/1.1

Add new resource to it

Slug: **janedev**

```
<> dc:title "Jane Developer".
```

# Direct Container (2/2)

**HTTP request**

```
GET localhost/hydraconnect2015
```

The membershipResource...



**HTTP response**

```
[bunch of HTTP headers go here]
```

```
<localhost/hydraconnect2015/> a ldp:BasicContainer ;  
    dc:title "Hydra Connect 2015" ;  
    dc:subject {"Hydra conference in Minneapolis"} ;  
    ldp:contains <localhost/hydraconnect2015/session1> ;  
    hasSpeaker <localhost/speakers/janedev> .
```



...has new triple with  
hasMemberRelation  
predicate



...pointing to the new  
resource

# Containers

- “Containers are at the heart of LDP” – [Robert Sanderson](#)
- In Direct and Indirect Containers you can revert the relationship (hasMemberRelation vs isMemberOfRelation)
- In an Indirect Container you can link to a totally different resource than the one added
- Shameless plug: LDP Containers for the Perplexed  
<http://tinyurl.com/ldp-containers>
- Read the W3C LDP Recommendation <http://www.w3.org/TR/ldp/>

# Updates

- Updates have not been standardized :(
- The Linked Data Platform Working Group ***is currently favoring LD Patch but still is deciding.***
- Other candidates include SPARQL 1.1, SparqlPatch, TurtlePatch, and RDF Patch
- As of July/2015, Linked Data Patch Format (LD Patch) is a note, *not* a recommendation
- LD Patch <http://www.w3.org/TR/2015/NOTE-lpatch-20150728/>

# Why is LDP important to Hydra?

- Fedora 4 is an LDP Server\*
- The Hydra Stack (i.e. your app) is an LDP Client
  - gems: LDP, ActiveTriples, ActiveFedora



\* Some restrictions apply

# Thanks!

- Official W3C LDP Recommendation

<http://www.w3.org/TR/ldp/>

- LDP Primer

<http://www.w3.org/TR/ldp-primer/>

- Slides/notes/examples

<http://hectorcorrea.com/introduction-to-ldp>