

Taking Information Into Accounts

The Data Projection Model

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Contents

- There is a lot of information.
- Information is a mess.
- There are multiple ways to consider the same information.
- To be trusted, information needs to be accounted for.

... Introducing the Data Projection Model



Information is a mess

If you can make it in New York, you can make it everywhere.

What's New York?

- New York is a **state**, a **city**, and a **county**. Plus a multi-faceted fantasy.
- **New York City** is the same as the **City of New York**.

In Brooklyn, which is in New York City, "The City" means "Manhattan".

- Brooklyn is a borough of New York City. But there are other **Brooklyn** in **Indiana, in Maryland, in Alabama, in Connecticut, etc.**
- For Brooklyn in New York State, the postal addresses are : "Brooklyn NY", like all other cities in the state. In the postal address **New York, New York**, the first New York means Manhattan. It is the county in which Manhattan is located. But this rule is not extensible. Otherwise, addresses in Brooklyn would be "Kings, NY" and in Queens: "Queens, NY". But you don't live officially in Queens, you live in a village in the New York State, which happens to be located in a county called Queens: Long Island City, Astoria, Flushing, etc.
- The borough of Bronx has two official names: "Bronx" and "The Bronx". (County of Bronx, the Borough of **The** Bronx)



Ontologies, Taxonomies, Databases, Semantic Web, Linked Data...

- Let's all agree about the meaning of everything.
- Let's organize it and have computers handle it.
- Let's build systems that will help us reason and tell us what we want.
- It ... works, but ...



Multiple Perspectives

- Perspective is a mathematical method to flatten the world, so that 3 dimensional objects can be represented on a flat surface.
- It has been studied and created by artists.
- One reality, multiple points of view.



Flattening the world

- Perspectives are defined according to projections.
- 3-d into 2-d



Luca Pacioli



Portrait of Luca
Pacioli,
Attributed to
Jacopo de Barbari,
1495
Source: Wikipedia

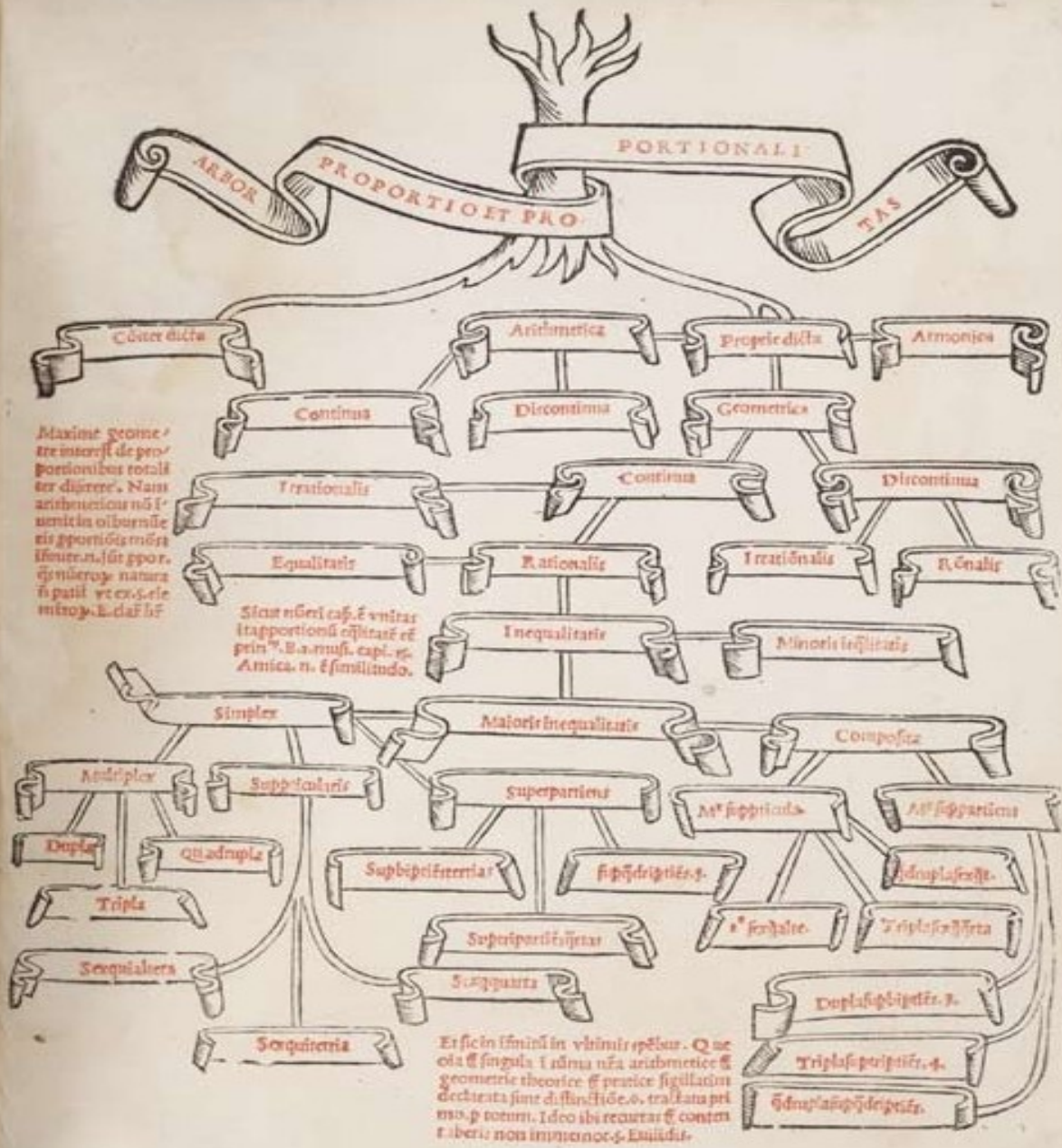
Worked on Perspective with Leonardo da Vinci.

“Invented” Double Entry Bookkeeping.

Wrote on Accounting Ethics and Cost Accounting.



Proportions as a Semantic Network



The tree of proportion and proportionality, by Luca Pacioli.

Information made accountable

- Accounting is based on a method called “Double Entry Bookkeeping” where each amount of money is involved in a transaction.
- Money doesn't come from nowhere. It flows between **accounts**.
- Credit / Debit



Data Projection

- Each information unit is connected to at least another one.
- Thus it's possible where it comes from.
- Multidimensional information is “flattened” into bidirectional relationships.
- Perspective is the way to look at it.



Content & Processes

- Information systems are made of units of meaning and processes.
- Triples everywhere. Actually: Quads

Ora Lassila is the author of RDF

subject predicate object

operand operator operand

2 + 3

2 + 3 = 5

operand operator operand



Perspector

A “**perspector**” is notated:

$$\langle x \mid o \mid y \rangle$$

x and y are operands (order matters).
o is an operator.

A perspector can represent a semantic relation, for example:

$$\langle \text{New York} \mid \text{is a} \mid \text{city} \rangle$$

(This is an instance/class relationship)

$$\langle \text{city} \mid \text{added by} \mid \text{MB} \rangle$$

(This is usually considered metadata).



The limitations of RDF (as it is used)

The problem

Subject – Predicate –
Object: A single view
on things

Not contextual: Who
said what?

Operates in a closed
world

First order logic works
if everything known

The fix

Derive meaning from
multiple triples

Every node is an
“account”.

Multiple perspectives
are enabled.

Logic is not built-in,
multiple logics can
be super-imposed.



Example: Name versus Subject

A Name does not identify a Subject

- Variant names may be used to designate the same subject.
 - Synonyms
 - Typographical variations
- One name may identify several subjects.



Names

Wash. DC

Washington, DC

General Washington

Denzel Washington

Washington

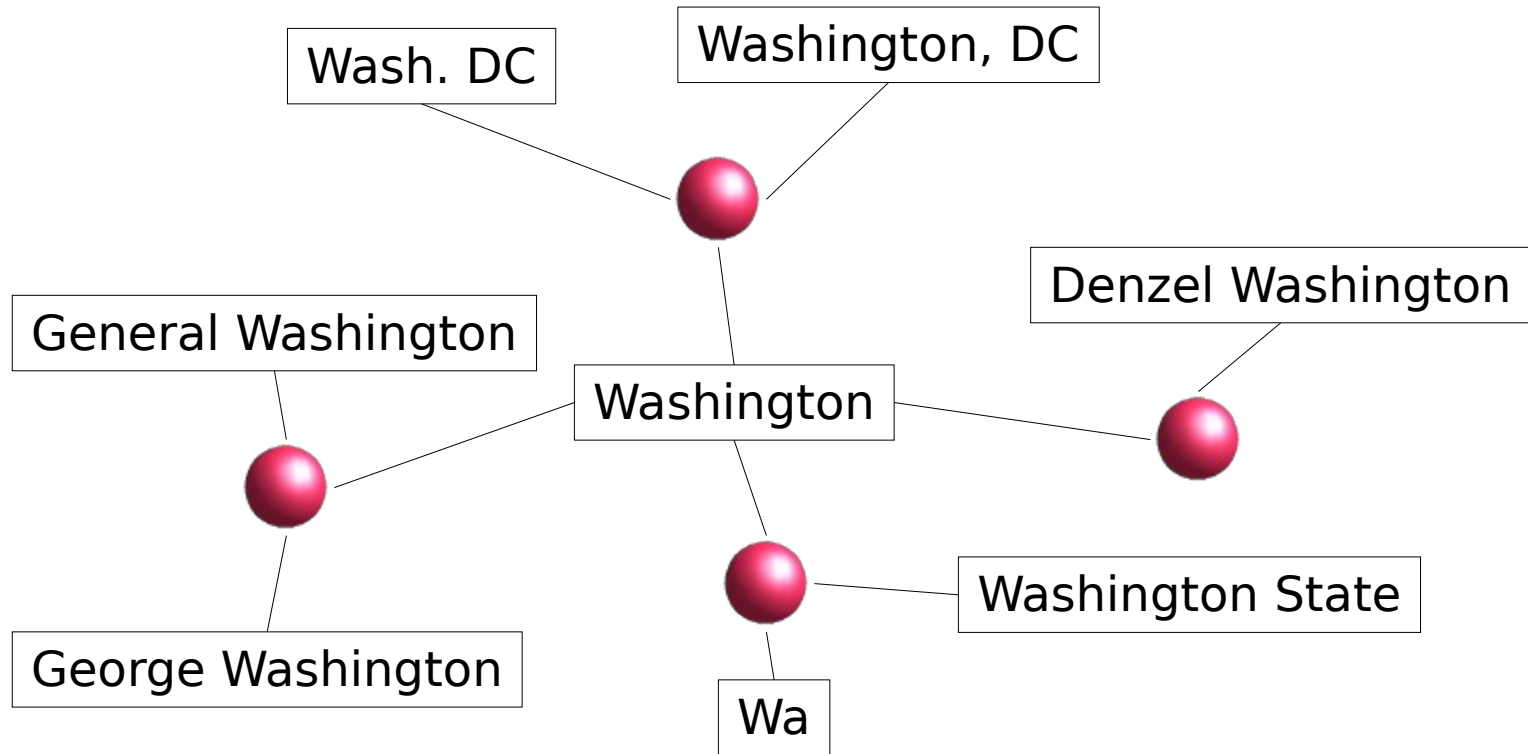
Washington State

George Washington

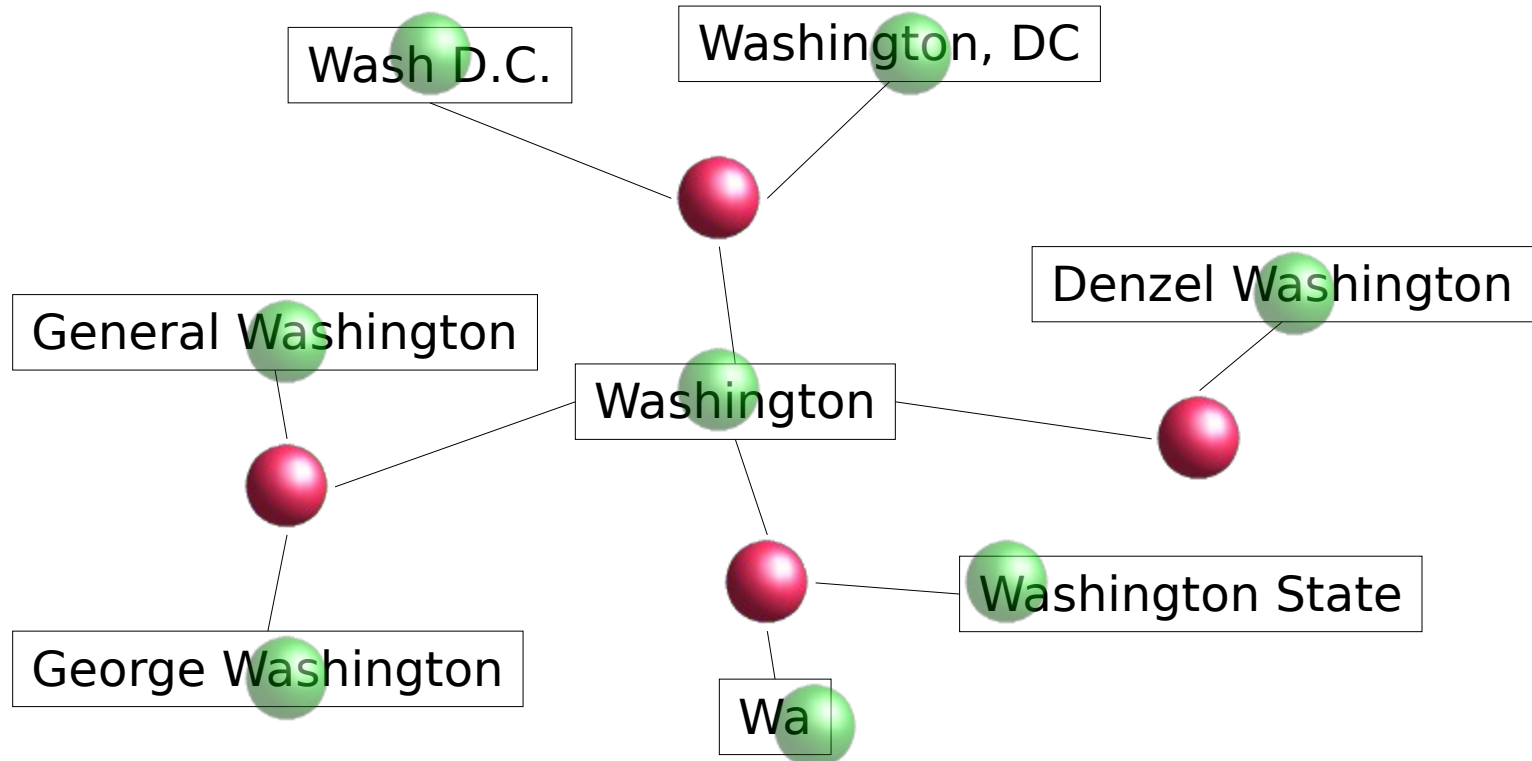
Wa



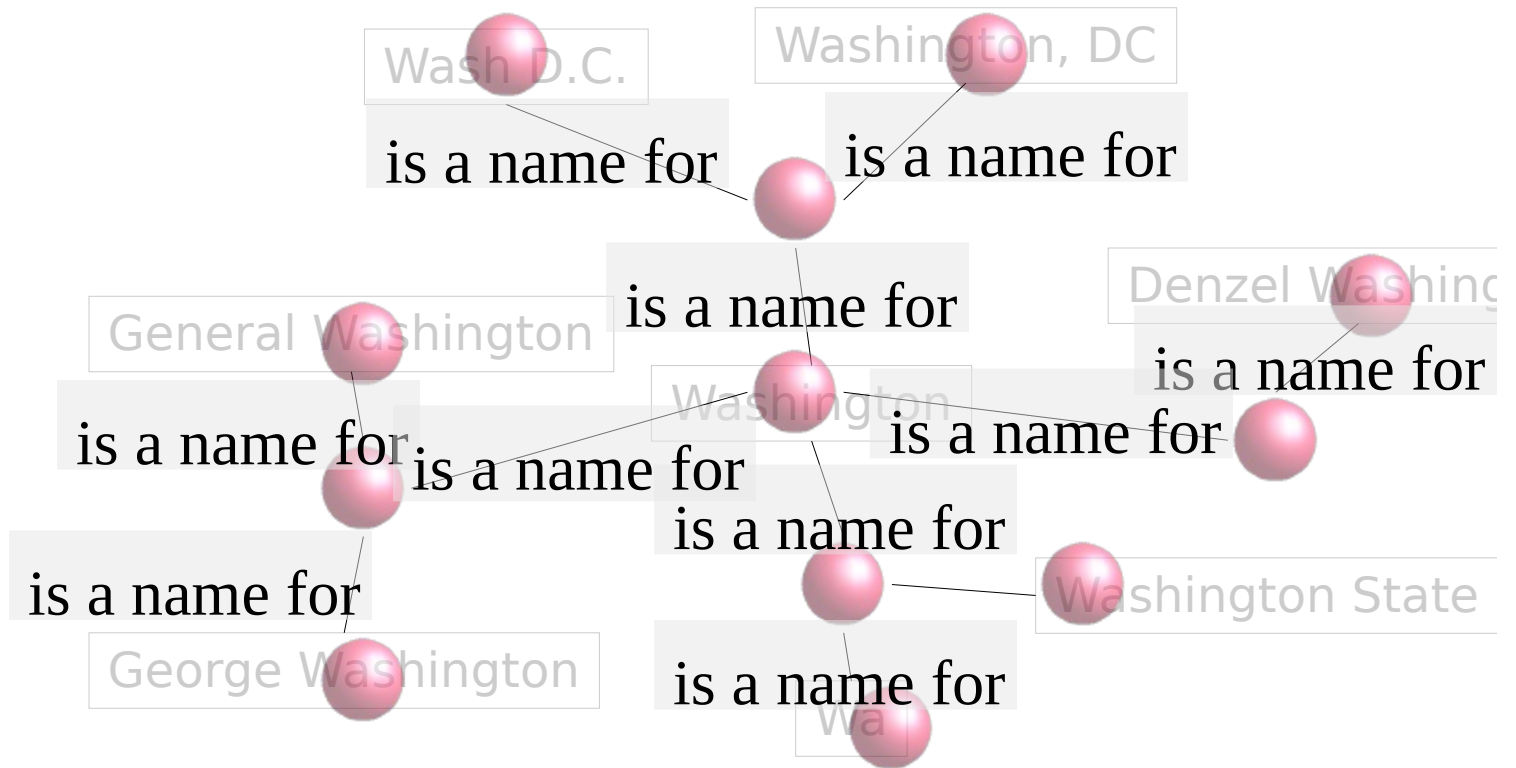
Emerging Subjects



Strings Become Subjects



Generalization



Names and Subjects

```
< Washington      | is a name for | _city_of_Washington >
< Washington DC   | is a name for | _city_of_Washington >
< Wash. D.C.     | is a name for | _city_of_Washington >
< Washington      | is a name for | _General_G_Washington >
< General Washington | is a name for | _General_G_Washington >
< George Washington | is a name for | _General_G_Washington >
< Washington      | is a name for | Washington_State >
< Wa              | is a name for | _Washington_State >
< Washington State | is a name for | _Washington_State >
< Washington      | is a name for | _Denzel_Washington >
< Denzel Washington | is a name for | _Denzel_Washington >
```

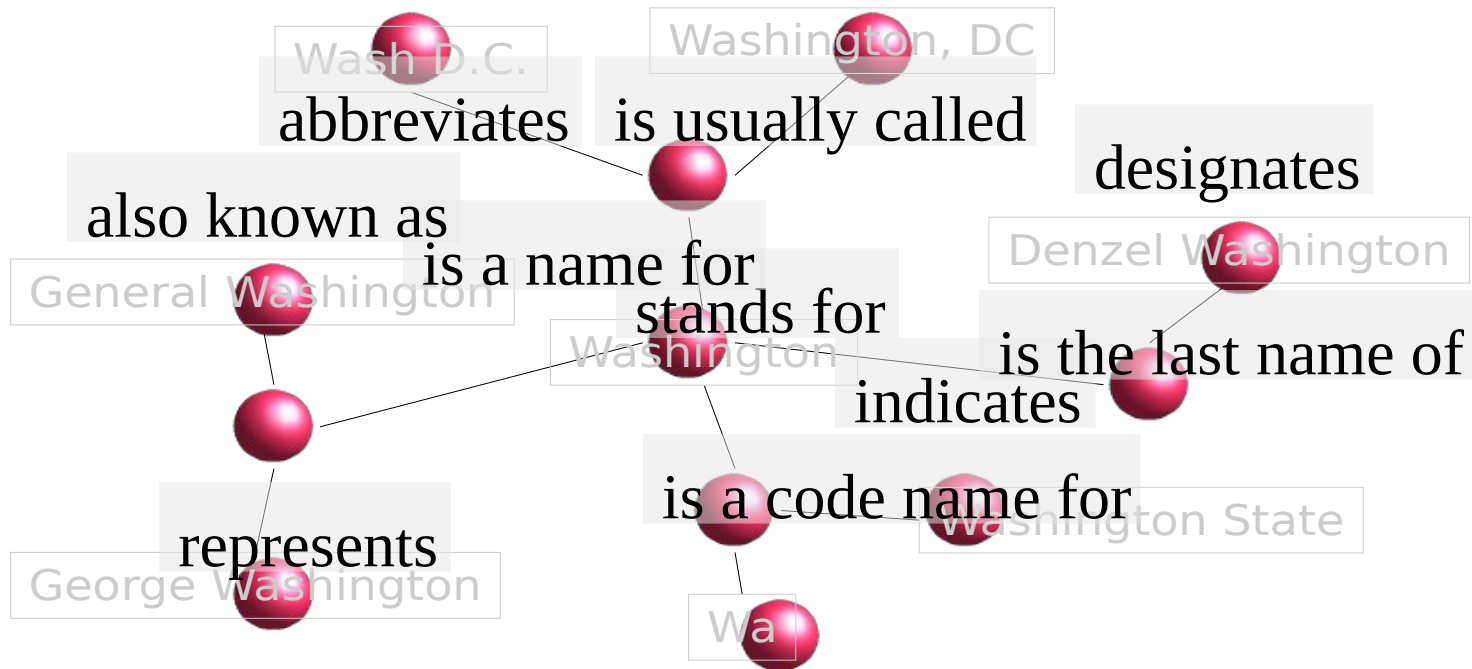


Strings as Subjects

```
< Washington      | is in character set | UTF-8      >  
< Washington      | is a name for      | _city_of_ Washington >  
< Washington      | is a name in the   | _language_ | English    >
```



Integration



Diversity

< city_of Washington
< Washington DC
< Wash. D.C.
< Washington
< General G Washington
< George Washington
< Washington
< Wa
< Washington State
< Washington
< Denzel Washington

is usually called
indicates
abbreviates
is a name for
also known as
represents
stands for
is a code name for
is a name for
is last name of
designates

Washington >
city_of Washington >
city_of Washington >
General G Washington
General Washington >
General G Washington
Washington State >
Washington State >
Washington State >
Denzel Washington >
Denzel Washington >



Perspective on Naming

| | | |
|------------------------|---------------|------------------------|
| < city_of Washington | ← is named → | Washington > |
| < Washington DC | is a name for | city_of Washington > |
| < Wash. D.C. | is a name for | city_of Washington > |
| < Washington | is a name for | General_G Washington > |
| < General_G Washington | ← is named → | General Washington > |
| < George Washington | is a name for | General_G Washington > |
| < Washington | is a name for | Washington_State > |
| < Wa | is a name for | Washington_State > |
| < Washington State | is a name for | Washington_State > |
| < Washington | is a name for | Denzel Washington > |
| < Denzel Washington | is a name for | Denzel_Washington > |



Multidimensional Information

| | | | |
|--------------|---------------------------|------------------|---|
| < New York | is a name for | New_York_City | > |
| < New York | is a name for | _New_York_State | > |
| < New York | is a name for | _New_York_County | > |
| < New York | is a name for | _Manhattan | > |
| < New York | is a name for | _Wall_Street | > |
| < New York | is an old name for | _Manhattan | > |
| < Nueva York | is a name for | _New_York_City | > |
| < ניוֹרֵק | is a name for | _New_York_City | > |
| < New York | is a name in the language | _English | > |
| < Nueva York | is a name in the language | _Spanish | > |
| < New York | is a name in the language | _French | > |
| < English | is a name for | _English | > |
| < English | is a name in the language | _English | > |
| < Anglais | is a name for | _English | > |
| < Anglais | is a name in the language | _French | > |
| < Inglés | is a name for | _English | > |
| < Inglés | is a name in the language | _Spanish | > |



More Information

Demos, other presentations available at:
<https://www.infloom.com>

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