





# Memento Experiment



Experiment conducted in the course of September and October 2009 by:

Los Alamos National Laboratory, Research Library, Prototyping Team: Lyudmila Balakireva, Robert Sanderson, Harihar Shankar, Herbert Van de Sompel

Old Dominion University, Computer Science Department: Scott Ainsworth, Michael Nelson

Herbert Van de Sompel

Michael Nelson

The [Memento](#) project researches new ideas related to [Web Archiving](#), focusing on the integration of Web Archives in regular Web navigation.

This Memento experiment is supported by the [Library of Congress](#) under the [National Digital Information Infrastructure and Preservation Program](#). Visit the [Digital Preservation site](#) for more information about the Program.

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# Memento: Time Travel for the Web

<http://www.mementoweb.org>

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The Memento Experiment was partly funded  
by the Library of Congress



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# Acknowledgments

- At the Los Alamos National Laboratory, Prototyping Team:
  - Robert Sanderson
  - Lyudmilla Balakireva
  - Harihar Shankar
- At Old Dominion University, Web Science and Digital Library Research Group:
  - Scott Ainsworth



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<http://www.newscientist.com/article/dn18158-timetravelling-browsers-navigate-the-webs-past.html>

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## Time-travelling browsers navigate the web's past


15:41 16 November 2009 by **Paul Marks**

Finding old versions of web pages could become far simpler thanks to a "time-travelling" web browsing technology being pioneered at the Los Alamos National Laboratory in New Mexico.

Bookmarking a page takes you to its current version – but earlier ones are harder to find (to see an award-winning 1990s incarnation of newscientist.com, see our gallery of web pages past, right). One option is to visit a resource like the [Internet Archive's](#) Wayback Machine. There, you key in the URL of the site you want and are confronted with a matrix of years and dates for old pages that have been cached. Or, if you want to check how a Wikipedia page has evolved, you can hit the "history" tab on a page of interest and scroll through in an attempt to find the version of the page on the day you're interested in.

It's a lot of hassle. But it shouldn't be, says [Herbert Van de Sompel](#), a computer

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## Four short links: 18 November 2009

### Web Time Travel, UK Map Data Liberation, Streetview Mashups, 3D Retail

by [Nat Torkington](#) | [@gnat](#) | [comments: 0](#)

1. [Memento: Time Travel for the Web](#) -- clever versioning hack that uses HTTP's content negotiation to negotiate about the date!
2. [Ordnance Survey Maps to Go Online](#) -- *The prime minister said that by April he hoped a consultation would be completed on the free provision of Ordnance*

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http://story.chinanationalnews.com/index.php/ct/9/cid/d805653303cbbba8/id/566360/cs/1/

# China National News

ChinaNationalNews.com Thursday 19th November 2009 Edition 323/2009

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Missouri accused receives more child rape charges

Global Carbon Project says Copenhagen must work

Election protesters sentenced to death in Iran

Germany continues its hunt of old Nazi's

Australian doctors separate conjoined twins

Humanitarian concerns in climate change at the forefront of discussions



[www.ChineseVoice.com](http://www.ChineseVoice.com)

### Soon, 'time-travelling' browsing technology to navigate web's past

China National News  
Tuesday 17th November, 2009  
(ANI)

London, Nov 17 : A 'time-travelling' web browsing technology is being pioneered at the Los Alamos National Laboratory in New Mexico to make it simpler to find old versions of web pages.

Called Memento, the system Herbert Van de Sompel, a computer scientist at Los Alamos, is developing alongside colleagues from Old Dominion University in Norfolk, Virginia, gives browsers a "time-travel" mode, allowing users to find web pages from particular dates and times without having to navigate through archives.

Ads by Google

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Turning Today's Ideas into Tomorrow's Energy  
[www.ZayedFutureEnergy.com](http://www.ZayedFutureEnergy.com)

### [How 2 Build Solar Panels](#)

Learn To Generate Your Own Energy  
Reduce Home Energy Bills Up To 95%  
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SEARCH THE WEB CNN.com SEARCH

Home Page Updated: 9:54 p.m. EST (02:54 GMT), February 14, 2006

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U.S.  
Weather  
Business at CNNMoney  
Sports at SI.com  
Politics  
Law  
Technology  
Science & Space  
Health  
Entertainment  
Travel  
Education  
Special Reports  
Video  
Autos with Edmunds.com

**Three nations report bird flu fears**



A worker watches swans near a power plant in Austria.

Three countries on Tuesday feared bird flu had reached into their borders, as public health officials battle the disease on fronts across the globe. Germany and Austria reported apparent cases of H5N1 bird flu in wild swans, and Iran's government said the disease had been detected in birds found dead near the Caspian Sea. The disease first appeared in China and has spread across Asia to Europe, Africa and the Middle East.

[FULL STORY | THE CNN WIRE](#)

- [Bird flu fears in Nigeria](#)
- [Gallery: Pandemic worst-case scenarios](#)

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Availa  
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**VISA**  
SIGNATURE

Feb 14 2006

Cheney prays for hunt victim



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# Looking at the Past can be Fun

The screenshot shows the Fox News website interface from February 14, 2006. At the top left is the Fox News logo and a search bar. A banner at the top right reads "Mandatory Drug Tests in School? Monday, 1am / 5am ET". The main content area features two primary headlines: "Press Attacks" with a sub-headline "Reporters grill White House on why news of Dick Cheney shooting man was not disclosed ASAP" and a photo of Dick Cheney, and "Entwistle Revealed" with a sub-headline "Online records released" and a photo of a man. To the right of these is a large empty box labeled "LATEST NEWS". Below the "Press Attacks" headline are links for "Video: White House Defends Delay" and "Story: Hunter in Stable Condition". Below the "Entwistle Revealed" headline is a link for "Video: Search Warrant Released". To the right of the "Entwistle Revealed" headline is a story titled "U.S. Skier Avoids Major Injury" with a sub-headline "American gold medal contender Lindsey Kildow in frightening free-fall crash on downhill training run" and a photo of Lindsey Kildow. Below this story are links for "U.S. Women Hit Halfpipe | Hack Threat | Coverage" and "Thrilling 500-Meter Skate Finish | Luge Crash". At the bottom of the page, there are three small sections: "New GOP Direction?", "Drawing on Experience", and "Fortunately, You're a Pervert".

Feb 14 2006

Press Attacks Cheney



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And Memento wants to make it Easy

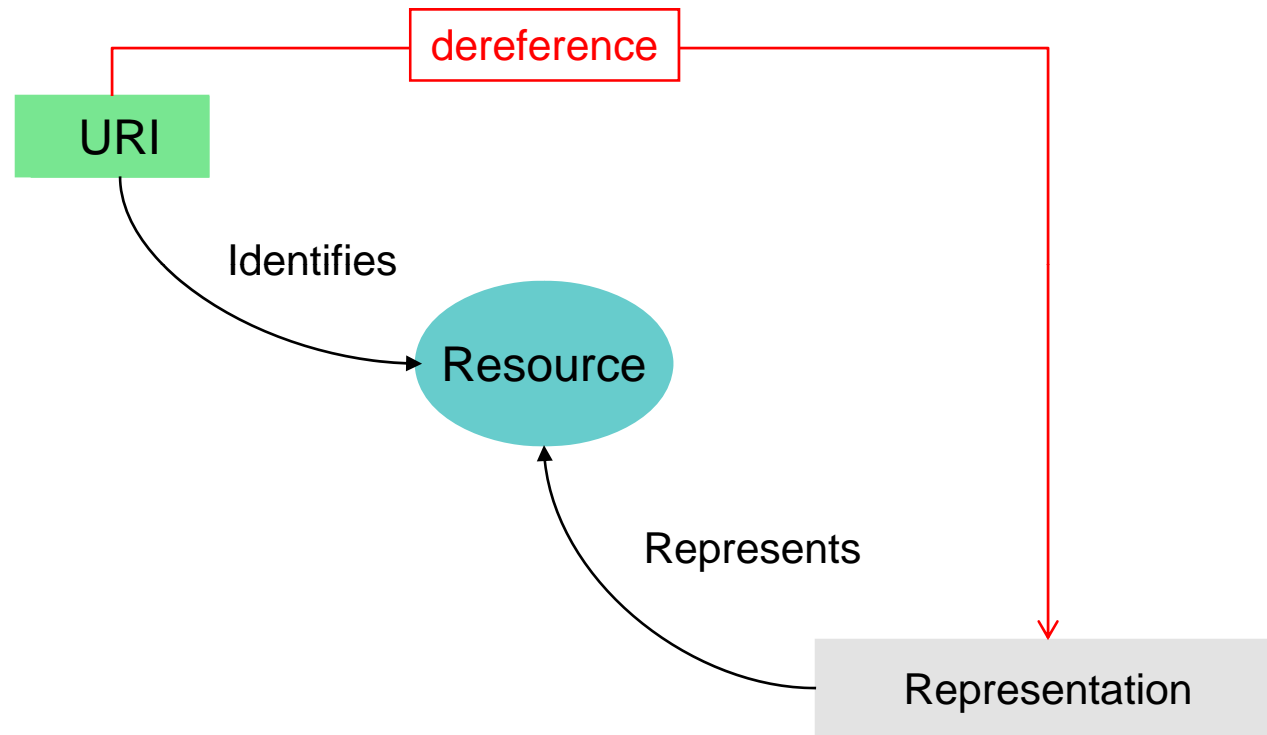


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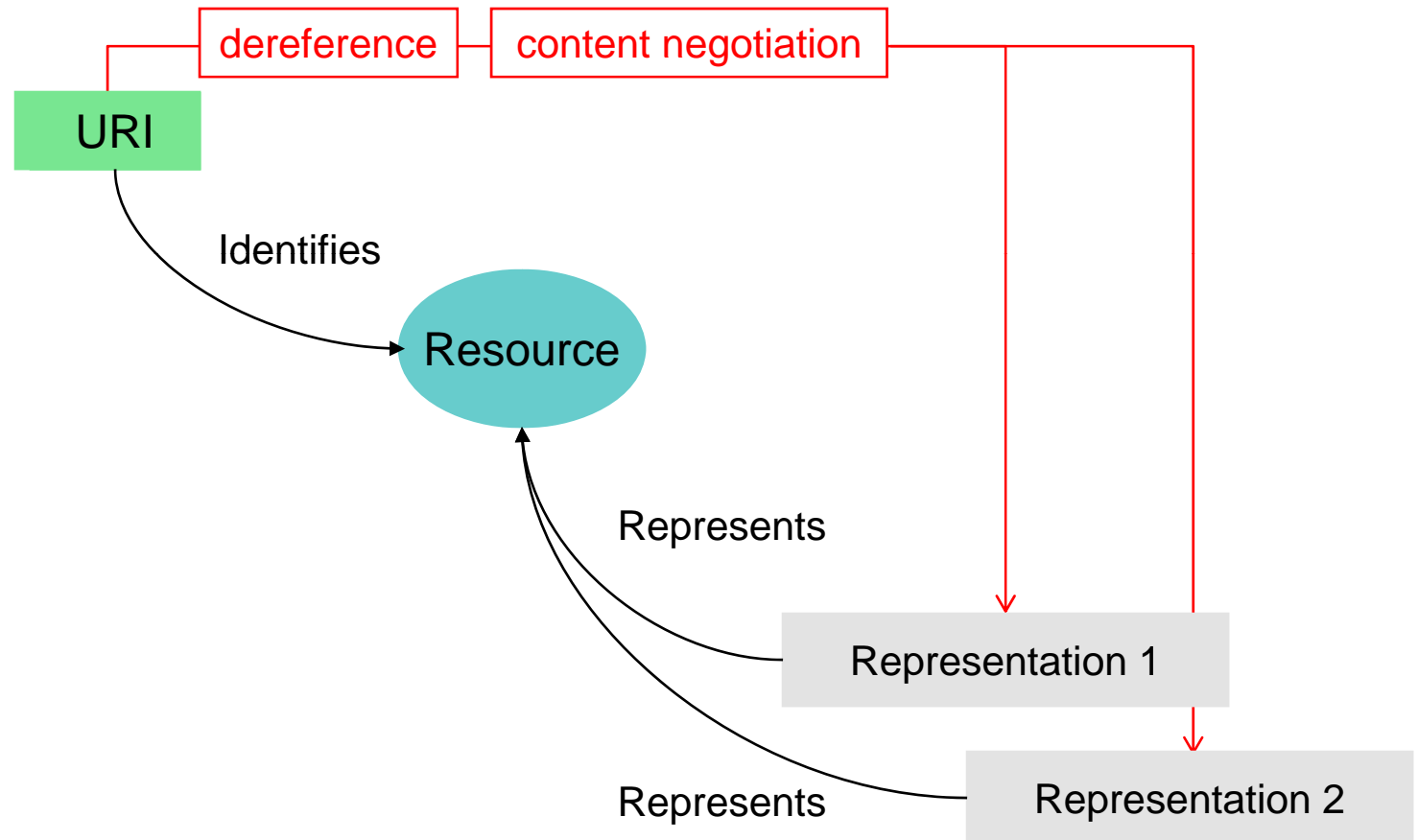




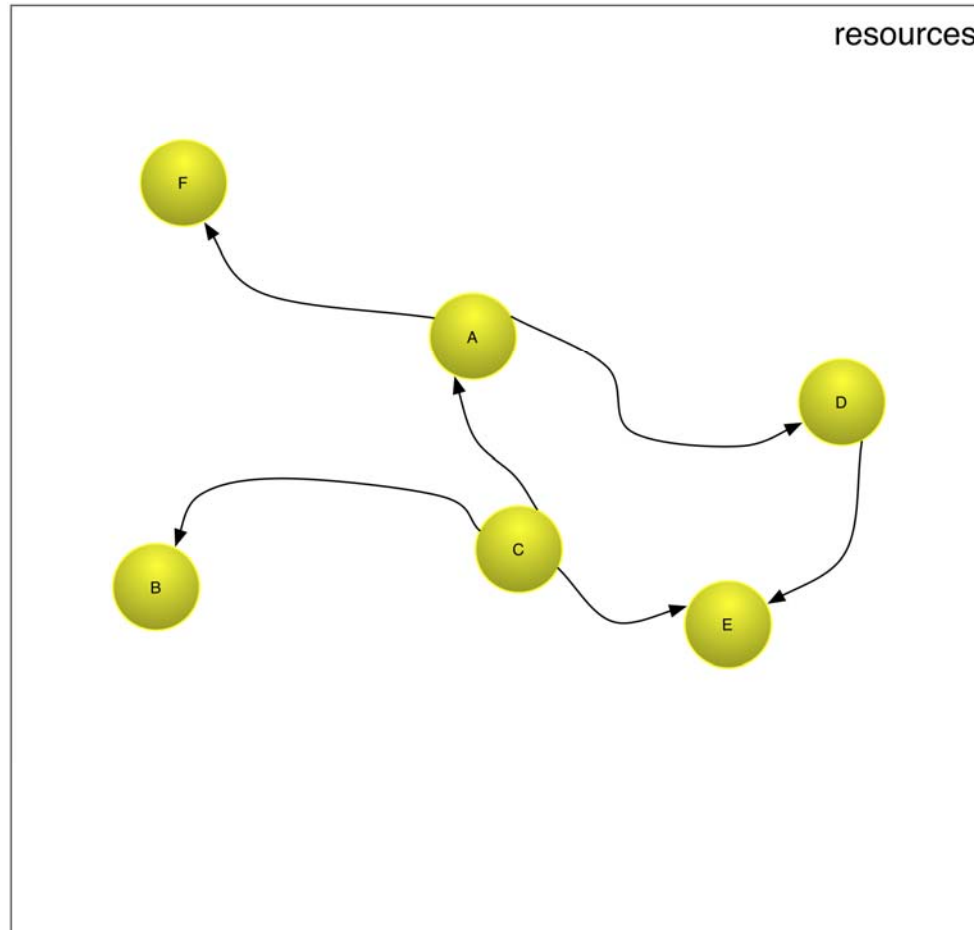
# W3C Web Architecture: Resource – URI - Representation



# W3C Web Architecture: Resource – URI - Representation



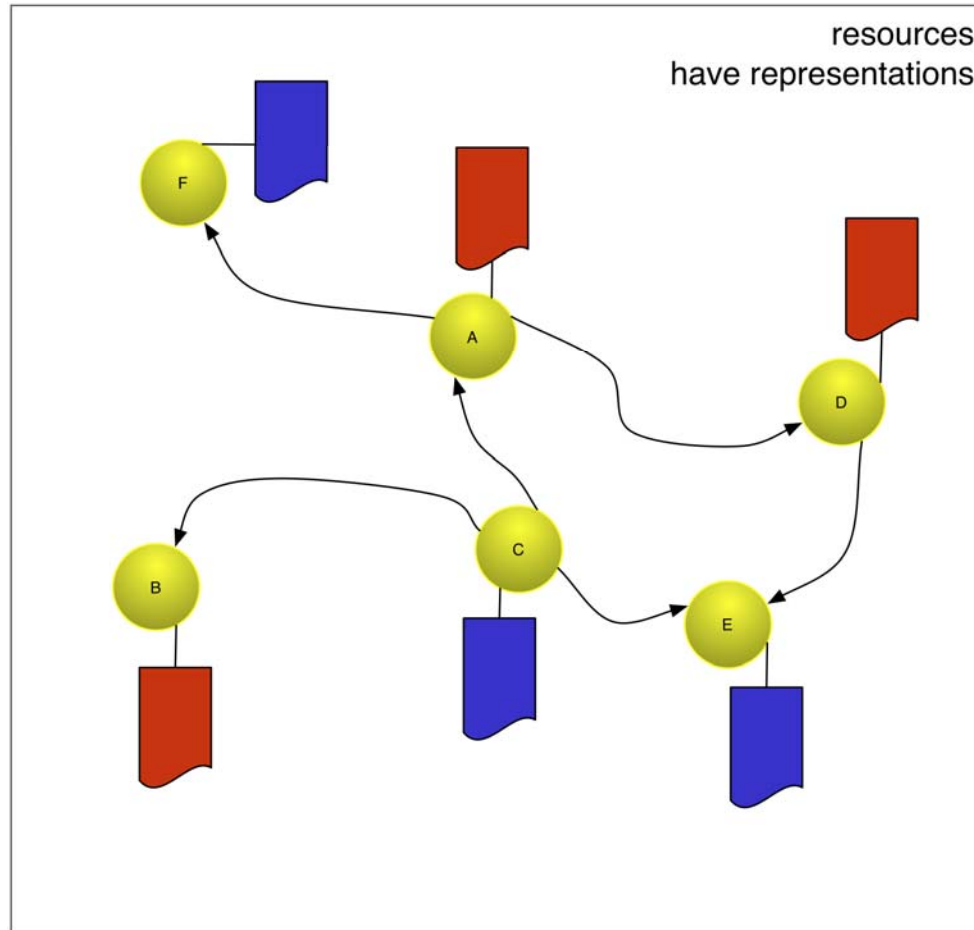
# Resources



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# Resources have Representations

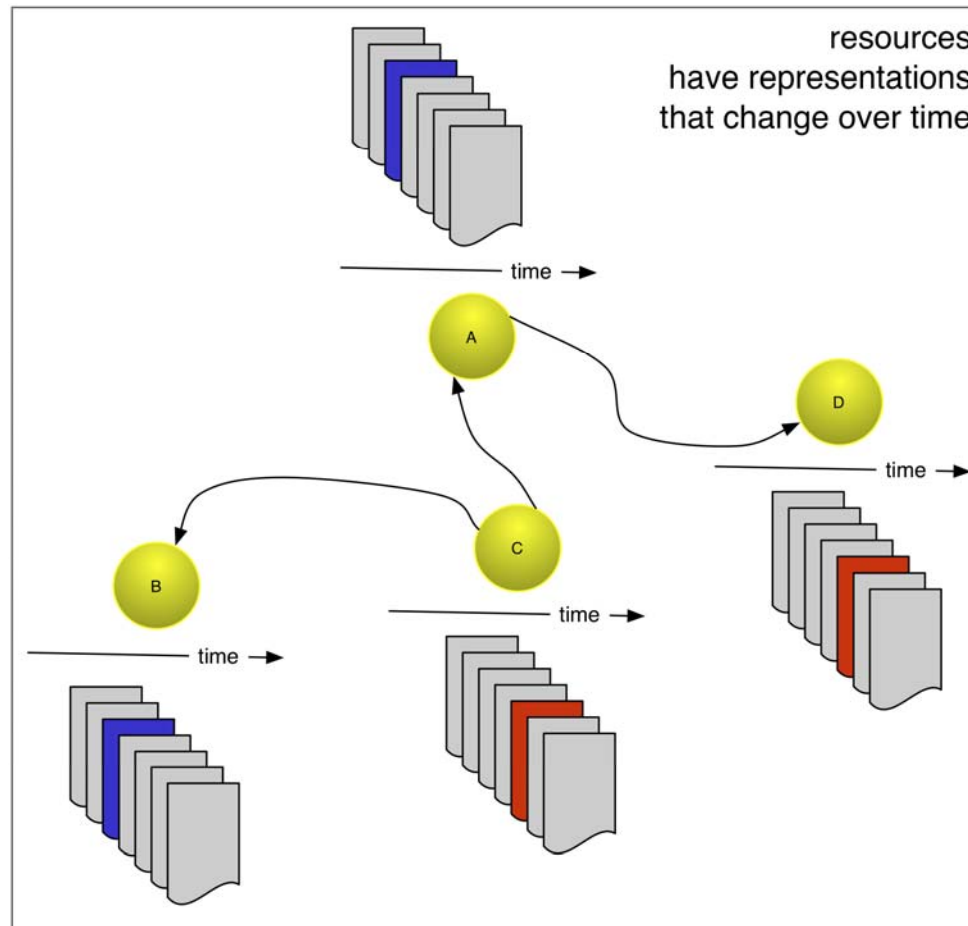


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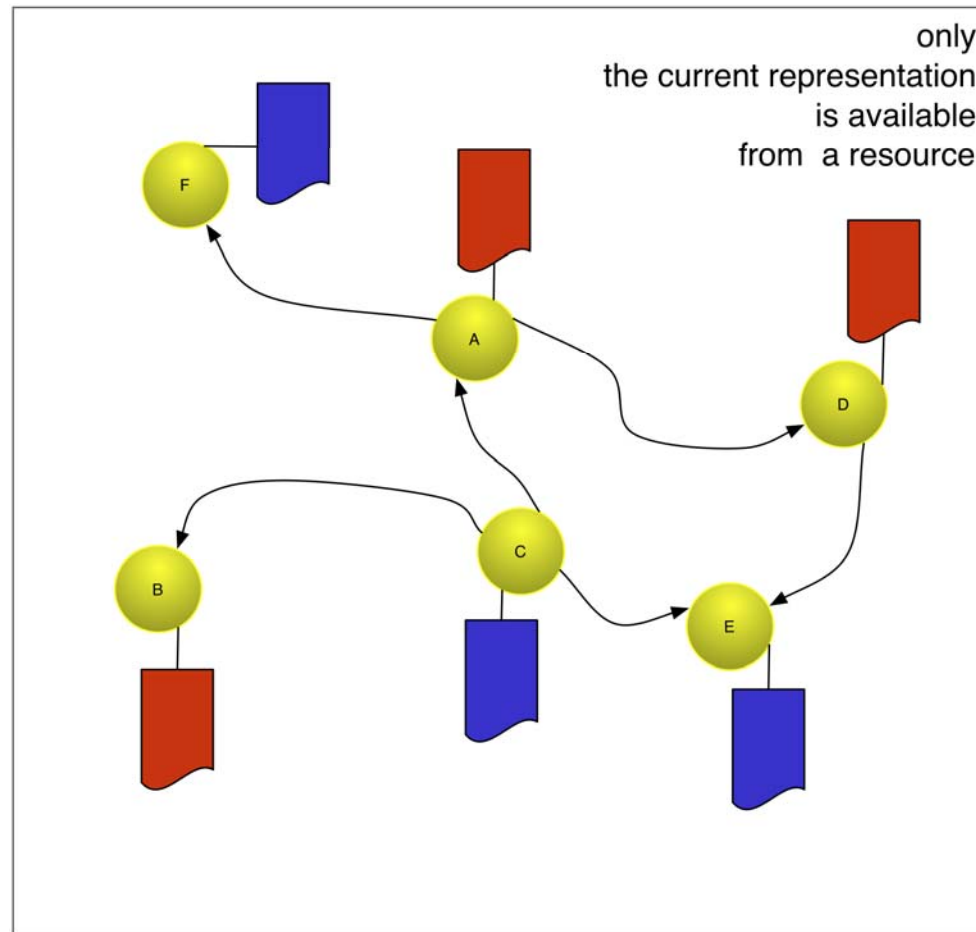
# Resources have Representations that Change over Time



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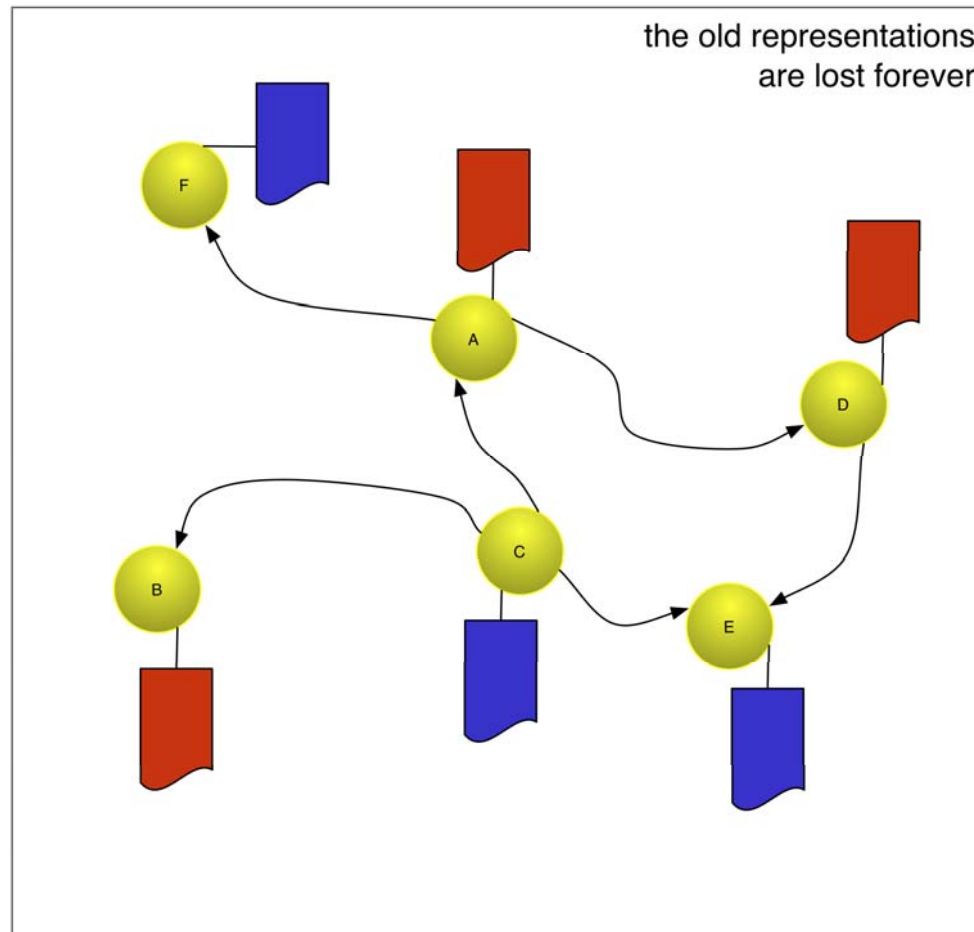
# Only the Current Representation is Available from a Resource



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# Old Representations are Lost Forever



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## There is no Time Dimension to HTTP, the Web

*Resource state may evolve over time. Requiring a URI owner to publish a new URI for each change in resource state would lead to a significant number of broken references. For robustness, Web architecture promotes independence between an identifier and the state of the identified resource.*

From: The Architecture of the World Wide Web,  
<http://www.w3.org/TR/webarch/>

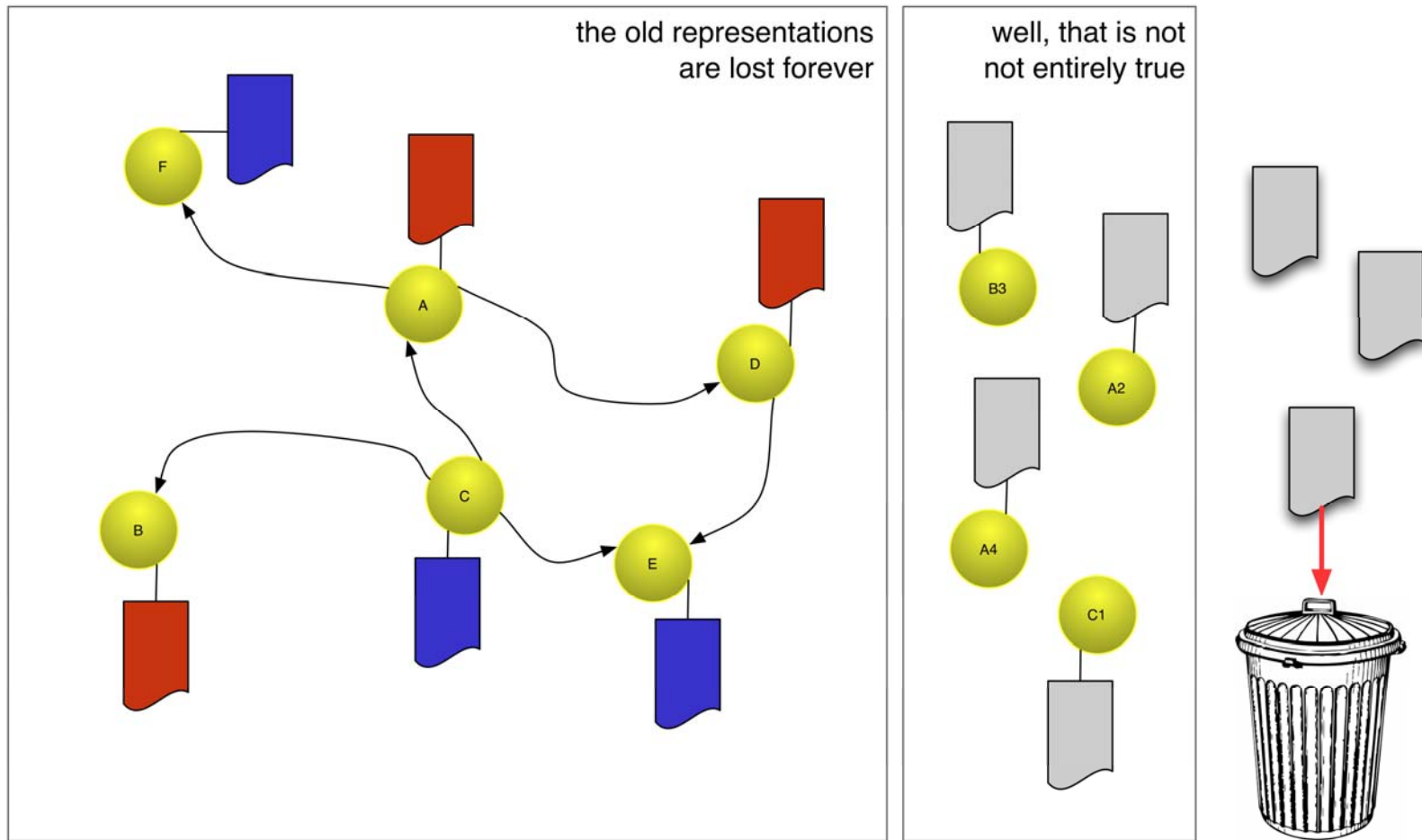


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# Archived Resources Exist



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Sep 11 2001, 20:36:10 UTC

Dec 20 2001, 4:51:00 UTC

## Archived Resources

**CNN.com SPECIAL REPORT**

Updated: 5:42 p.m. EDT -- 11 September 2001

**AMERICA UNDER ATTACK**  
CNN EXCLUSIVE

**Terrorists strike New York, D.C.**  
At 8:45 a.m. EDT, the first of two airliners crashed into the World Trade Center, opening a horrifying and apparently coordinated terrorist attack on the United States, which saw the collapse of the two 110-story towers into surrounding Manhattan streets and a later attack on the Pentagon.

**COMPLETE COVERAGE**

- World Trade Center towers collapse after hit
- Crash destroys part of Pentagon
- White House, Capitol evacuated
- American, United confirm losing planes
- Bush: 'We'll hunt them down' | Statement
- U.S. officials: More attacks can't be ruled out
- Attacks strike financial markets

**U.S. SCENE**

- FAA grounds all U.S. flights until noon Wednesday
- U.S. military on 'high alert'
- Major sports events postponed

**WORLD SCENE**

- Taliban statement: 'Afghanistan feels your pain'
- World in shock | Evacuations amid chaos
- Middle East, Asia condemn attacks

**RESOURCES AND RESCUE**

- Giuliani: 1,500 'walking wounded' in New York
- Emergency contact information

**VIDEO**  
Watch video of second plane crash at World Trade Center  
[More audio/video >>](#)

**PHOTO GALLERY**  
Aftermath of the attacks in New York and Washington

**CHRONOLOGY**  
At 8:45 a.m. EDT, day of disaster begins  
[Map of attacks](#)

**EXTRA INFO**  
[World Trade Center, Pentagon, 767](#)

**September 11 attacks**  
From Wikipedia, the free encyclopedia

This is an old revision of this page, as edited by The Cunctator (talk | contribs) at 04:51, 20 December 2001. It may differ significantly from the current revision.  
(diff) ← Previous revision | Current revision (diff) | Newer revision → (diff)

**In Memoriam, September 11, 2001**

On the morning of September 11, 2001, what might well be the most devastating terrorist attack in the history of the world occurred concurrently in New York City, Washington, D.C. and near Pittsburgh. Four passenger jets were hijacked and then deliberately crashed into the World Trade Center and the Pentagon. Both towers of the World Trade Center subsequently collapsed, and part of the Pentagon was destroyed in the ensuing fire. Casualties are expected to be in the thousands: 265 on the planes; about 3000 people (early estimates ranged as high as 6500 people), including hundreds of firefighters who had rushed in, at the World Trade Center; and 125 at the Pentagon.

Some passengers on the doomed flights were able to make phone calls reporting on events on board. They reported that there were more than one hijacker on each plane and that they took control of the planes using box-cutter knives. It appears that the passengers on the fourth jet tried to overpower the hijackers and that the plane crashed in a sparsely populated area as a result, thereby missing its intended target, which may have been the White House.

The attack had immediate and deep global political effects and economic effects and inspired an international outpouring of memorials and services. The massive undertaking of rescue and recovery, and of providing assistance to the survivors and victims, is ongoing. There will be a great need for donations for a long time.

Though no group has claimed responsibility, the U.S. government immediately launched a full-scale response, stating its intentions to go to war against those responsible. On October 7, a coalition led by the United States launched an attack in Afghanistan. See 2001 U.S. Attack on Afghanistan.

Following the attack, the United States has been on heightened alert for new terrorist attacks. In late September, cases of anthrax started breaking out; although, no connection to the September 11 attack has been found. See 2001 anthrax attack.

<http://web.archive.org/web/20010911203610/http://www.cnn.com/> archived resource for <http://cnn.com>

[http://en.wikipedia.org/w/index.php?title=September\\_11\\_attacks&oldid=282333](http://en.wikipedia.org/w/index.php?title=September_11_attacks&oldid=282333) archived resource for [http://en.wikipedia.org/wiki/September\\_11\\_attacks](http://en.wikipedia.org/wiki/September_11_attacks)



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# Finding Archived Resources

able here 6 months after collection. See FAQ.

| Search Results for Jan 01, 1996 - May 14, 2009 |              |              |              |              |              |              |              |
|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 2000   | 2001         | 2002         | 2003         | 2004         | 2005         | 2006         | 2007         |
| 30 pages                                       | 2734 pages   | 231 pages    | 156 pages    | 625 pages    | 1186 pages   | 886 pages    | 953 pages    |
| Jun 20, 2000                                   | Mar 01, 2001 | Jan 23, 2002 | Jan 29, 2003 | Jan 01, 2004 | Jan 01, 2005 | Jan 01, 2006 | Jan 01, 2007 |
| Jun 21, 2000                                   | Mar 02, 2001 | Feb 02, 2002 | Jan 31, 2003 | Jan 02, 2004 | Jan 01, 2005 | Jan 01, 2006 | Jan 01, 2007 |
| Jun 21, 2000                                   | Mar 05, 2001 | Feb 09, 2002 | Feb 01, 2003 | Jan 03, 2004 | Jan 02, 2005 | Jan 02, 2006 | Jan 02, 2007 |
| Jun 21, 2000                                   | Mar 07, 2001 | Feb 10, 2002 | Feb 01, 2003 | Jan 10, 2004 | Jan 02, 2005 | Jan 02, 2006 | Jan 02, 2007 |
| Jun 21, 2000                                   | Mar 09, 2001 | Feb 11, 2002 | Feb 02, 2003 | Jan 11, 2004 | Jan 03, 2005 | Jan 03, 2006 | Jan 02, 2007 |
| Jul 06, 2000                                   | Mar 31, 2001 | Feb 13, 2002 | Feb 02, 2003 | Jan 12, 2004 | Jan 04, 2005 | Jan 03, 2006 | Jan 03, 2007 |
| Jul 07, 2000                                   | Apr 10, 2001 | Feb 13, 2002 | Feb 03, 2003 | Jan 12, 2004 | Jan 05, 2005 | Jan 03, 2006 | Jan 03, 2007 |
| Jul 11, 2000                                   | Apr 13, 2001 | Feb 14, 2002 | Feb 05, 2003 | Jan 13, 2004 | Jan 06, 2005 | Jan 04, 2006 | Jan 04, 2007 |
| Aug 04, 2000                                   | Apr 13, 2001 | Feb 15, 2002 | Feb 06, 2003 | Jan 15, 2004 | Jan 06, 2005 | Jan 04, 2006 | Jan 05, 2007 |
| Aug 15, 2000                                   | Apr 13, 2001 | Feb 16, 2002 | Feb 07, 2003 | Jan 16, 2004 | Jan 06, 2005 | Jan 04, 2006 | Jan 05, 2007 |
| Aug 15, 2000                                   | Apr 14, 2001 | Feb 20, 2002 | Feb 10, 2003 | Jan 17, 2004 | Jan 07, 2005 | Jan 04, 2006 | Jan 06, 2007 |
| Aug 15, 2000                                   | Apr 14, 2001 | Feb 22, 2002 | Feb 10, 2003 | Jan 20, 2004 | Jan 07, 2005 | Jan 05, 2006 | Jan 06, 2007 |
| Aug 15, 2000                                   | Apr 14, 2001 | Feb 22, 2002 | Feb 11, 2003 | Jan 20, 2004 | Jan 08, 2005 | Jan 05, 2006 | Jan 06, 2007 |
| Aug 16, 2000                                   | Apr 18, 2001 | Feb 23, 2002 | Feb 12, 2003 | Jan 20, 2004 | Jan 09, 2005 | Jan 05, 2006 | Jan 07, 2007 |
| Aug 16, 2000                                   | May 03, 2001 | Feb 23, 2002 | Feb 12, 2003 | Jan 24, 2004 | Jan 09, 2005 | Jan 06, 2006 | Jan 07, 2007 |
| Aug 17, 2000                                   | May 03, 2001 | Feb 23, 2002 | Feb 13, 2003 | Jan 27, 2004 | Jan 10, 2005 | Jan 06, 2006 | Jan 07, 2007 |
| Aug 17, 2000                                   | May 03, 2001 | Feb 24, 2002 | Feb 15, 2003 | Jan 28, 2004 | Jan 10, 2005 | Jan 06, 2006 | Jan 07, 2007 |
| Aug 18, 2000                                   | May 03, 2001 | Feb 26, 2002 | Mar 20, 2003 | Jan 30, 2004 | Jan 10, 2005 | Jan 06, 2006 | Jan 07, 2007 |
| Aug 28, 2000                                   | May 03, 2001 | Feb 27, 2002 | Mar 21, 2003 | Jan 30, 2004 | Jan 11, 2005 | Jan 07, 2006 | Jan 08, 2007 |
| Sep 20, 2000                                   | May 03, 2001 | Mar 27, 2002 | Mar 21, 2003 | Jan 31, 2004 | Jan 11, 2005 | Jan 07, 2006 | Jan 08, 2007 |
| Sep 30, 2000                                   | May 03, 2001 | Mar 29, 2002 | Mar 24, 2003 | Feb 02, 2004 | Jan 12, 2005 | Jan 07, 2006 | Jan 08, 2007 |
| Oct 18, 2000                                   | May 04, 2001 | May 25, 2002 | Mar 25, 2003 | Feb 02, 2004 | Jan 12, 2005 | Jan 07, 2006 | Jan 08, 2007 |
| Nov 09, 2000                                   | May 04, 2001 | May 27, 2002 | Mar 26, 2003 | Feb 03, 2004 | Jan 13, 2005 | Jan 08, 2006 | Jan 08, 2007 |
| Nov 10, 2000                                   | May 04, 2001 | May 27, 2002 | Mar 29, 2003 | Feb 04, 2004 | Jan 13, 2005 | Jan 09, 2006 | Jan 08, 2007 |
| Nov 10, 2000                                   | May 04, 2001 | May 28, 2002 | Mar 29, 2003 | Feb 07, 2004 | Jan 13, 2005 | Jan 09, 2006 | Jan 08, 2007 |
| Nov 17, 2000                                   | May 04, 2001 | May 29, 2002 | Mar 30, 2003 | Feb 10, 2004 | Jan 14, 2005 | Jan 10, 2006 | Jan 08, 2007 |
| Nov 18, 2000                                   | May 04, 2001 | May 30, 2002 | Mar 31, 2003 | Feb 10, 2004 | Jan 14, 2005 | Jan 10, 2006 | Jan 09, 2007 |
| Dec 04, 2000                                   | May 04, 2001 | May 30, 2002 | Apr 01, 2003 | Feb 11, 2004 | Jan 14, 2005 | Jan 10, 2006 | Jan 09, 2007 |
| Dec 04, 2000                                   | May 04, 2001 | May 30, 2002 | Apr 04, 2003 | Feb 13, 2004 | Jan 15, 2005 | Jan 10, 2006 | Jan 09, 2007 |
| Dec 04, 2000                                   | May 05, 2001 | May 31, 2002 | Apr 04, 2003 | Feb 13, 2004 | Jan 15, 2005 | Jan 10, 2006 | Jan 09, 2007 |
|  | May 05, 2001 | Jun 02, 2002 | Apr 05, 2003 | Feb 14, 2004 | Jan 15, 2005 | Jan 10, 2006 | Jan 10, 2007 |
|  | May 05, 2001 | Jun 02, 2002 | Apr 08, 2003 | Feb 14, 2004 | Jan 16, 2005 | Jan 10, 2006 | Jan 10, 2007 |
|  | May 05, 2001 | Jun 03, 2002 | Apr 08, 2003 | Feb 17, 2004 | Jan 16, 2005 | Jan 11, 2006 | Jan 11, 2007 |
|  | May 05, 2001 | Jun 03, 2002 | Apr 09, 2003 | Feb 18, 2004 | Jan 17, 2005 | Jan 11, 2006 | Jan 11, 2007 |
|  | May 05, 2001 | Jun 04, 2002 | Apr 09, 2003 | Feb 20, 2004 | Jan 17, 2005 | Jan 11, 2006 | Jan 12, 2007 |
|  | May 05, 2001 | Jun 06, 2002 | Apr 11, 2003 | Feb 21, 2004 | Jan 18, 2005 | Jan 11, 2006 | Jan 12, 2007 |
|  | May 05, 2001 | Jul 01, 2002 | Apr 20, 2003 | Feb 28, 2004 | Jan 18, 2005 | Jan 11, 2006 | Jan 12, 2007 |
|  | May 05, 2001 | Jul 02, 2002 | Apr 23, 2003 | Mar 02, 2004 | Jan 19, 2005 | Jan 11, 2006 | Jan 12, 2007 |
|  | May 05, 2001 | Jul 03, 2002 | Apr 23, 2003 | Mar 07, 2004 | Jan 19, 2005 | Jan 12, 2006 | Jan 13, 2007 |

Go to <http://www.archive.org/> and search <http://cnn.com>

On [http://web.archive.org/web/\\*/http://cnn.com](http://web.archive.org/web/*/http://cnn.com), select desired datetime



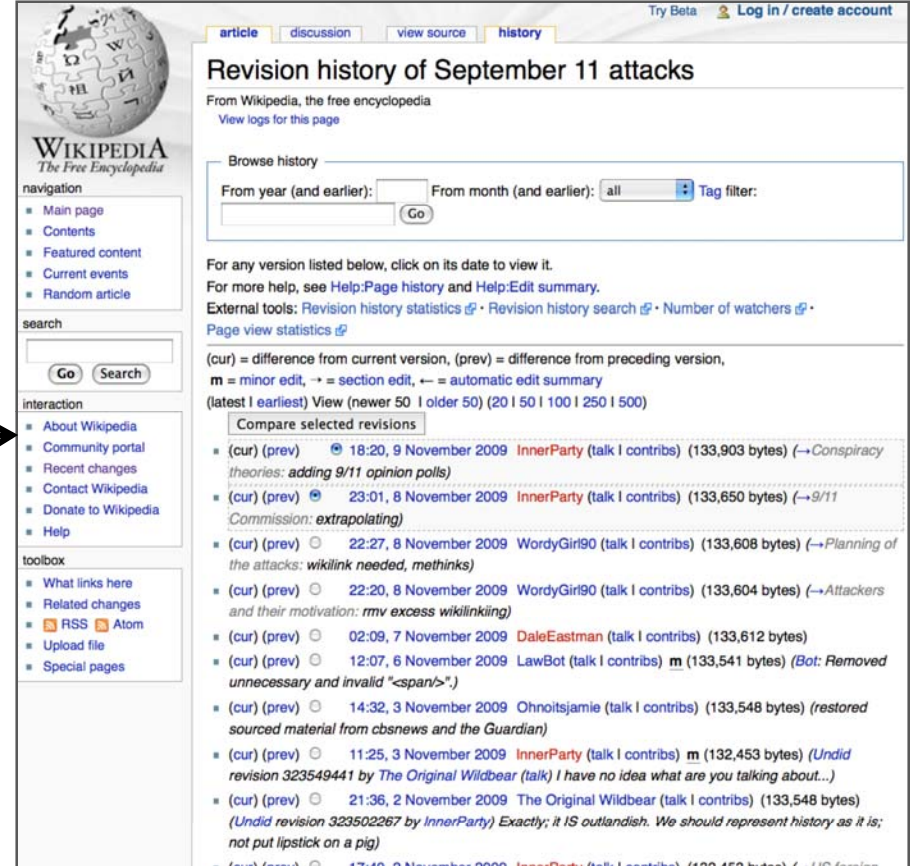
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# Finding Archived Resources



The screenshot shows the Wikipedia article for "September 11 attacks". The article text describes the coordinated suicide attacks by Al-Qaeda on September 11, 2001, in New York City and Arlington, Virginia. It mentions the hijacking of four commercial passenger jet airliners, the collapse of the Twin Towers of the World Trade Center, and the crash of a third airliner into the Pentagon. The article also notes the death of 2,995 people, including the hijackers, and the overwhelming majority of casualties were civilians. It mentions the United States' response, including the "War on Terrorism" and the USA PATRIOT Act.



The screenshot shows the "Revision history of September 11 attacks" page on Wikipedia. It displays a list of revisions, including the current version (cur) and previous versions (prev). The list includes the date, time, and user for each revision, along with the size of the revision in bytes. The current version is 18:20, 9 November 2009 by InnerParty (talk | contribs) (133,903 bytes). The previous version is 23:01, 8 November 2009 by InnerParty (talk | contribs) (133,650 bytes). The list also includes a "Compare selected revisions" button and a "View" button for each revision.

Go to

[http://en.wikipedia.org/wiki/September\\_11\\_attacks](http://en.wikipedia.org/wiki/September_11_attacks)  
and click History

Browse History



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Dec 20 2001, 4:51:00 UTC

current

# Navigating Archived Resources



[http://en.wikipedia.org/w/index.php?title=September\\_11\\_attacks&oldid=282333](http://en.wikipedia.org/w/index.php?title=September_11_attacks&oldid=282333) archived resource for  
[http://en.wikipedia.org/wiki/September\\_11\\_attacks3](http://en.wikipedia.org/wiki/September_11_attacks3)

[http://en.wikipedia.org/wiki/The\\_Pentagon](http://en.wikipedia.org/wiki/The_Pentagon)



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Sep 11 2001, 20:36:10 UTC

Sep 11 2001, 21:38:55 UTC

## Navigating Archived Resources

**CNN.com SPECIAL REPORT**

Updated: 5:42 p.m. EDT -- 11 September 2001

**AMERICA UNDER ATTACK**  
CNN EXCLUSIVE

**COMPLETE COVERAGE**

- World Trade Center towers collapse after hit
- Crash destroys part of Pentagon
- White House, Capitol evacuated
- American, United confirm losing planes
- Bush: 'We'll hunt them down' | Statement
- U.S. officials: More attacks can't be ruled out
- Attack at the financial markets

**U.S. SCENE**

- FAA grounds all U.S. flights until noon Wednesday
- U.S. military on 'high alert'
- Major sports events postponed

**WORLD SCENE**

- Taliban statement: 'Afghanistan feels your pain'
- World in shock | Evacuations amid chaos
- Middle East, Asia condemn attacks

**RESOURCES AND RESCUE**

Giuliani: 1,500 'walking wounded' in New York  
[Emergency contact information](#)

**Terrorists strike New York, D.C.**

At 8:45 a.m. EDT, the first of two airliners crashed into the World Trade Center, opening a horrifying and apparently coordinated terrorist attack on the United States, which saw the collapse of the two 110-story towers into surrounding Manhattan streets and a later attack on the Pentagon.

[FULL STORY >>](#)  
[SPECIAL REPORT >>](#)

**VIDEO**

Watch video of second plane crash at World Trade Center  
[More audio/video >>](#)

**PHOTO GALLERY**

Aftermath of the attacks in New York and Washington

**CHRONOLOGY**

At 8:45 a.m. EDT, day of disaster begins  
[Map of attacks](#)

**EXTRA INFO**

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<http://web.archive.org/web/20010911203610/http://www.cnn.com/> archived resource for <http://cnn.com>

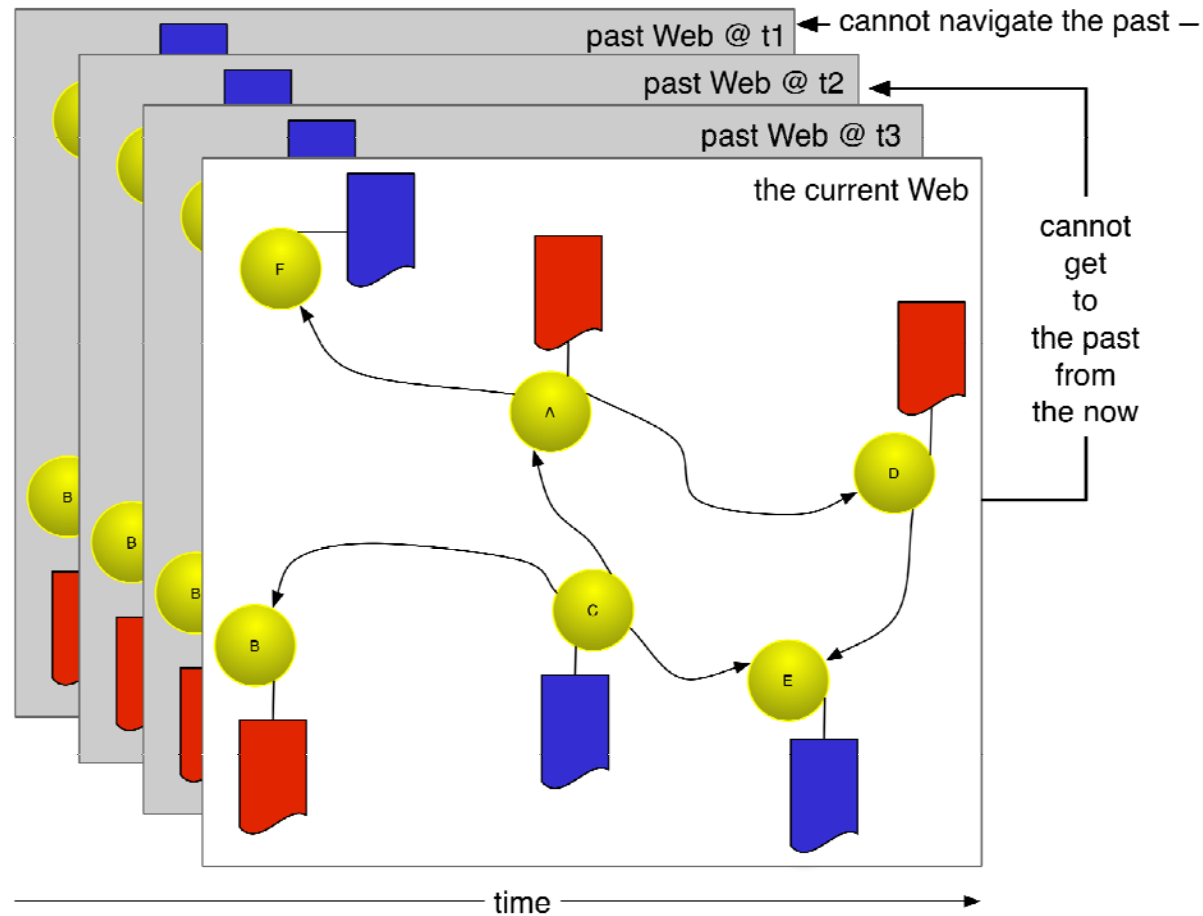
<http://web.archive.org/web/20010911213855/www.cnn.com/TECH/space/>



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# Current and Past Web are Not Integrated



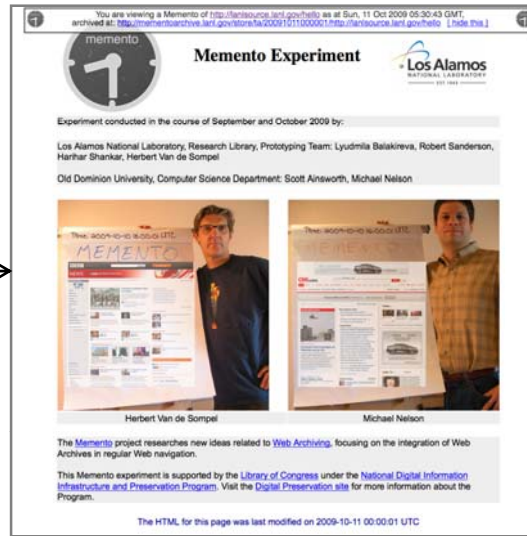
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# This is Where Memento comes in ...

Oct 11 2009, 05:30:33 UTC




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# This is Where Memento comes in ...

You are viewing a Memento of <http://lanlsource.lanl.gov/hello> as at Sun, 11 Oct 2009 05:30:43 GMT, archived at: <http://mementoarchive.lanl.gov/store/ta/20091011000001/http://lanlsource.lanl.gov/hello> [hide this]



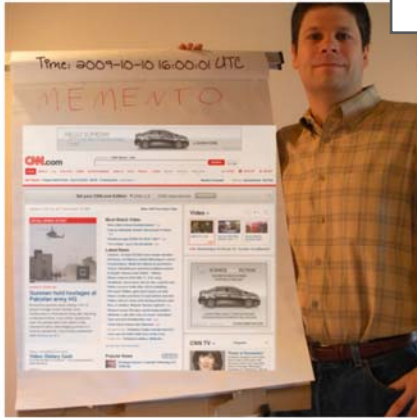

## Memento Experiment



Experiment conducted in the course of September and October 2009 by:

Los Alamos National Laboratory, Research Library, Prototyping Team: Lyudmila Balakireva, Robert Sanders, Harihar Shankar, Herbert Van de Sompel

Old Dominion University, Computer Science Department: Scott Ainsworth, Michael Nelson



Herbert Van de Sompel

Michael Nelson

The [Memento](#) project researches new ideas Archives in regular Web navigation.

This Memento experiment is supported by the [Library of Congress](#) under the [National Digital Information Infrastructure and Preservation Program](#). Visit the [Digital Preservation site](#) for more information about the Program.

The HTML for this page was last modified on 2009-10-11 00:00:01 UTC

From LANL and ODU transactional archives

Oct 11 2009, 00:00:01 UTC

Oct 10 2009, 18:00:01 UTC

Oct 10 2009, 16:00:01 UTC

Web Archiving

Oct 11 2009, 05:30:33 UTC

<http://lanlsource.lanl.gov/hello>

Oct 11 2009, 05:30:33 UTC



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# This is Where Memento comes in ...

You are viewing a Memento of [http://en.wikipedia.org/wiki/Web\\_archiving](http://en.wikipedia.org/wiki/Web_archiving) as at Sun, 11 Oct 2009 05:30:43 GMT, archived at: <http://en.wikipedia.org/w/index.php?oldid=317303288> [hide this]

## Web archiving

From Wikipedia, the free encyclopedia

This is an old revision of this page, as edited by 79.76.215.146 (talk) at 16:30, 1 October 2009. It may differ significantly from the current revision (diff) ← Previous revision | Current revision (diff) | Newer revision → (diff)

"Web Archive" redirects here. For the Safari format of the same name, see *webarchive*. For the KDE format, see *KDE WAR (file format)*.

**Web archiving** is the process of collecting portions of the *World Wide Web* and ensuring the collection is *preserved* in an *archive site*, for future researchers, historians, and the public. Due to the massive size of the Web, web archivists typically use *crawlers* for automated collection. The largest web archiving organization based on a crawling approach is the *Internet Archive* which strives to maintain an archive of the entire Web. *National libraries*, *national archives* and various consortia of organizations are also involved in archiving culturally important Web content. Commercial web archiving software and services are also available to organizations who need to archive their own web content for legal or regulatory purposes.

### Contents

- 1 Collecting the Web
- 2 Methods of collection
  - 2.1 Remote harvesting
    - 2.1.1 On-demand
  - 2.2 Database archiving
  - 2.3 Transactional archiving
- 3 Difficulties and limitations
  - 3.1 Crawlers
  - 3.2 General limitations
- 4 Aspects of Web curation
- 5 References
- 6 See also
- 7 External links

### Collecting the Web

Web archivists generally archive all types of web content including *HTML* web pages, *style sheets*, *JavaScript*, *images*, and *video*. They also archive *metadata* about the collected resources such as access time, *MIME type*, and content length. This metadata is useful in establishing *authenticity* and *provenance* of the archived collection.

### Methods of collection

#### Remote harvesting

The most common method of collecting web pages is in the same manner that users with a browser see the Web, and therefore provide a comparatively simple method of remotely harvesting web content. Examples of web crawlers frequently used for web archiving include:

- Heritrix
- HTTrack
- Offline Explorer
- Web Curator

From Wikipedia History

Oct 01 2009, 16:30:00 UTC

[http://en.wikipedia.org/wiki/Web\\_Archiving](http://en.wikipedia.org/wiki/Web_Archiving)

Oct 11 2009, 05:30:33 UTC

Robots Exclusion Protocol

Oct 11 2009, 05:30:33 UTC



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# This is Where Memento comes in ...

You are viewing a Memento of [http://en.wikipedia.org/wiki/Robots\\_exclusion\\_protocol](http://en.wikipedia.org/wiki/Robots_exclusion_protocol) as at Sun, 11 Oct 2009 05:30:43 GMT, archived at: <http://en.wikipedia.org/w/index.php?oldid=314187708> [hide this]

## Robots exclusion standard

From Wikipedia, the free encyclopedia

This is an old revision of this page, as edited by 128.189.120.54 (talk) at 20:49, 15 September 2009. It may differ significantly from the current revision.

(diff) ← Previous revision | Current revision (diff) | Newer revision → (diff)

For restricting Wikipedia bots, see *Template:Bots*.

The **Robot Exclusion Standard**, also known as the **Robots Exclusion Protocol** or **robots.txt protocol**, is a convention to cooperating web spiders and other web robots from accessing all or part of a website which is otherwise publicly viewable. Robots are often used by search engines to categorize and archive web sites, or by webmasters to proofread source code. The standard is unrelated to, but can be used in conjunction with, sitemaps, a robot inclusion standard for websites.

### Contents

- History
- About the standard
- Disadvantages
- Automated Content Access Protocol
- Examples
- Nonstandard extensions
  - 6.1 Crawl-delay directive
  - 6.2 Allow directive
  - 6.3 Sitemap
- Extended standard
- See also
- References
- External links

### History

robots.txt was popularized with the advent of *AltaVista*, the first popular search engine.

### About the standard

If a site owner wishes to give instructions to web robots he must place a text file called `robots.txt` to the root of the web site hierarchy (e.g. `www.example.com/robots.txt`). This text file should contain the instructions in a specific format (see examples below). Robots that wish to follow the instructions try to fetch this file and read the instructions before fetching any other file from the web site. If this file doesn't exist web robots assume that the web owner wishes to provide no specific instructions.

A robots.txt file only be, for example, or be misleading or

For websites with multiple subdomains, each subdomain must have its own robots.txt file. If `example.com` had a robots.txt file but `a.example.com` did not, the rules that would apply for `example.com` would not apply to `a.example.com`.

### Disadvantages

The protocol is purely advisory. It relies on the cooperation of the web robot, so that marking an area of a site out of bounds with robots.txt does not guarantee privacy. Some web site administrators have tried to use the robots file to make private parts of a website invisible to

From Wikipedia History

Sep 15 2009, 20:49:00 UTC

[http://en.wikipedia.org/wiki/Robots\\_exclusion\\_protocol](http://en.wikipedia.org/wiki/Robots_exclusion_protocol)

Oct 11 2009, 05:30:33 UTC

Robots Exclusion

Oct 11 2009, 05:30:33 UTC



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**The Web Robots Page**

Web Robots (also known as Web Wanderers, Crawlers, or Spiders), are programs that traverse the Web automatically. Search engines such as [Google](#) use them to index the web content, spammer use them to scan for email addresses, and they have many other uses.

On this site you can learn more about web robots.

- [About /robots.txt](#) explains what /robots.txt is, and how to use it.
- The [FAQ](#) answers many frequently asked questions, such as [How do I stop robots visiting my site?](#) and [How can I get the best listing in search engines?](#)
- The [Other Sites](#) page links to external resources for robot writers and a webmasters.
- The [Robots Database](#) has a list of robots.
- The [/robots.txt checker](#) can check your site's /robots.txt file and meta tags.
- The [IP Lookup](#) can help find out more about what robots are visiting you.

Last updated: 08 Nov 2007 15:08:21

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From Internet Archive

Nov 09 2007, 06:21:04 UTC

<http://www.robotstxt.org/>

Oct 11 2001, 05:30:33 UTC



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## How does Memento do This?

*In order to help understand how Memento introduces time travel for the Web, we present a brief recap of Transparent Content Negotiation (conneg) in HTTP.*

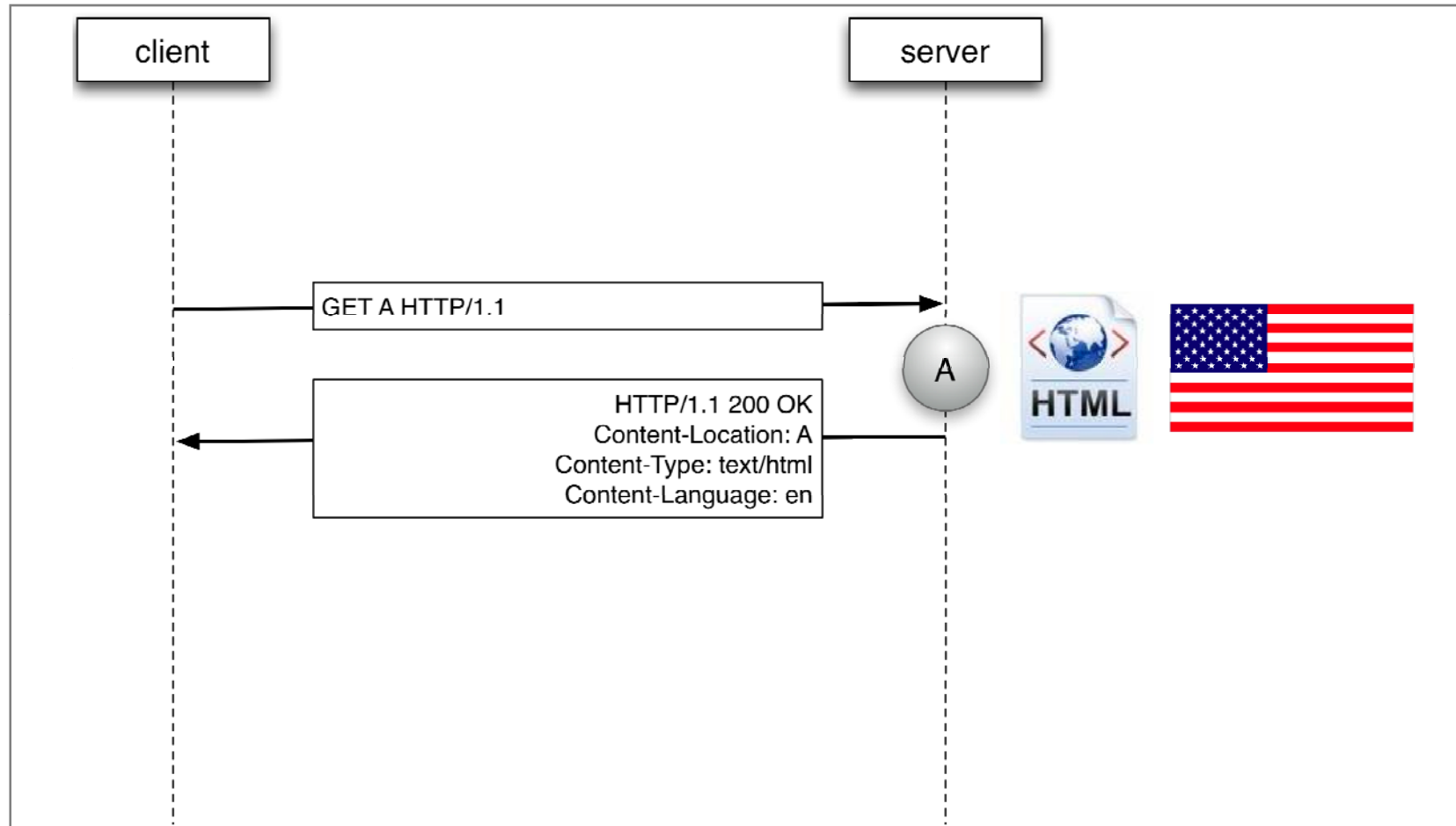
RFC 2295. Transparent Content Negotiation in HTTP,  
<http://www.ietf.org/rfc/rfc2295.txt>



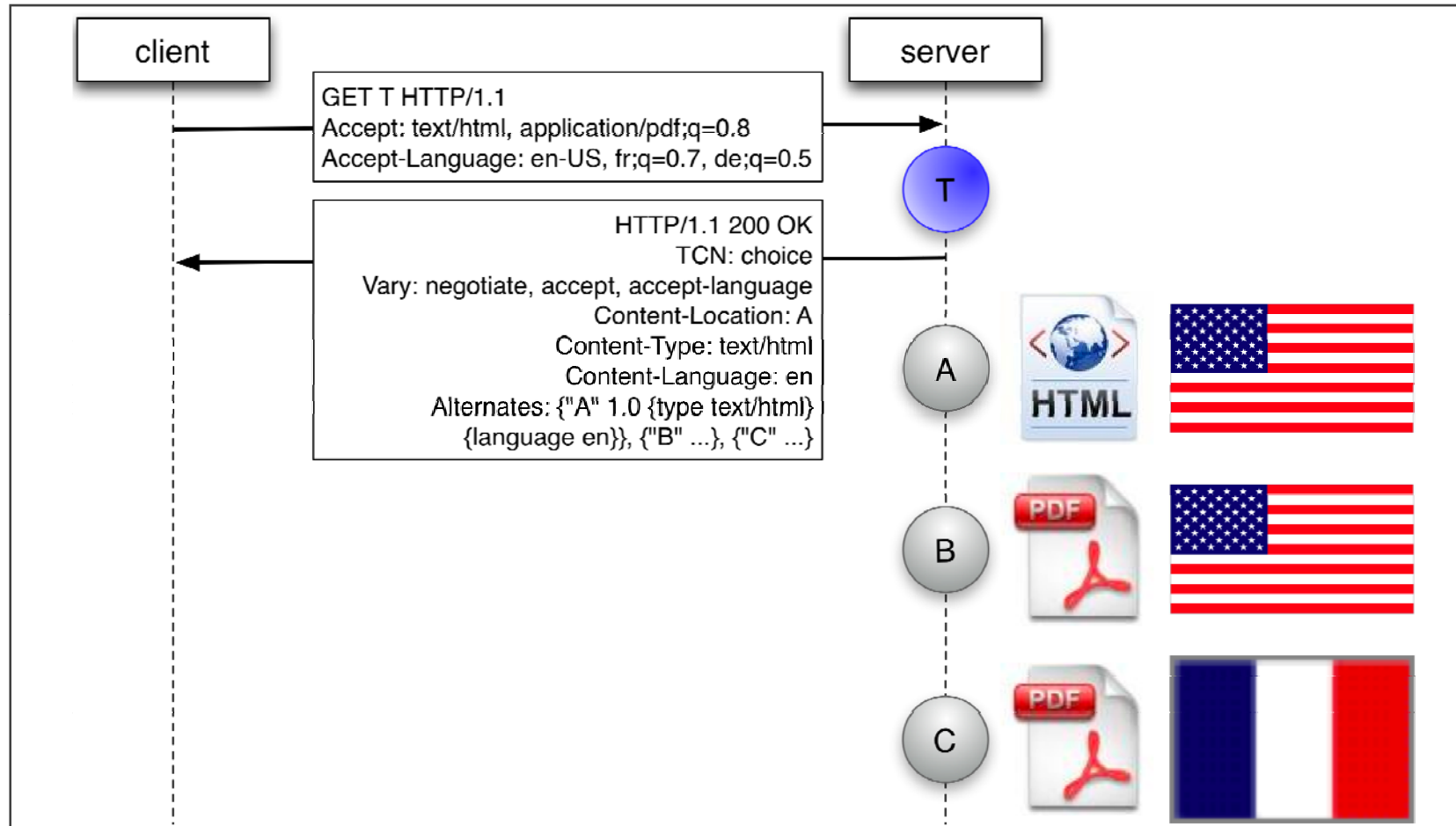
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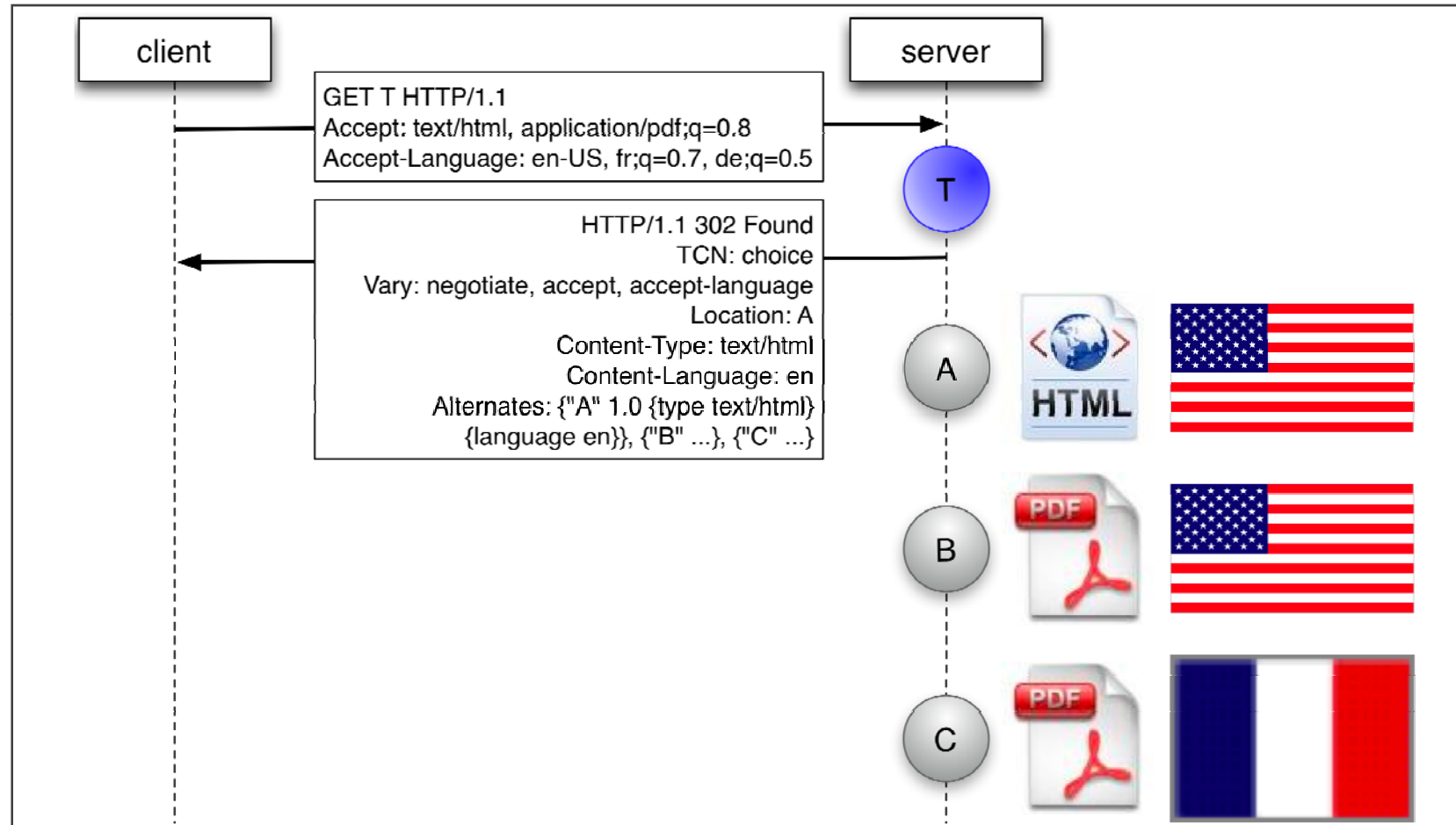
# HTTP GET on URI A



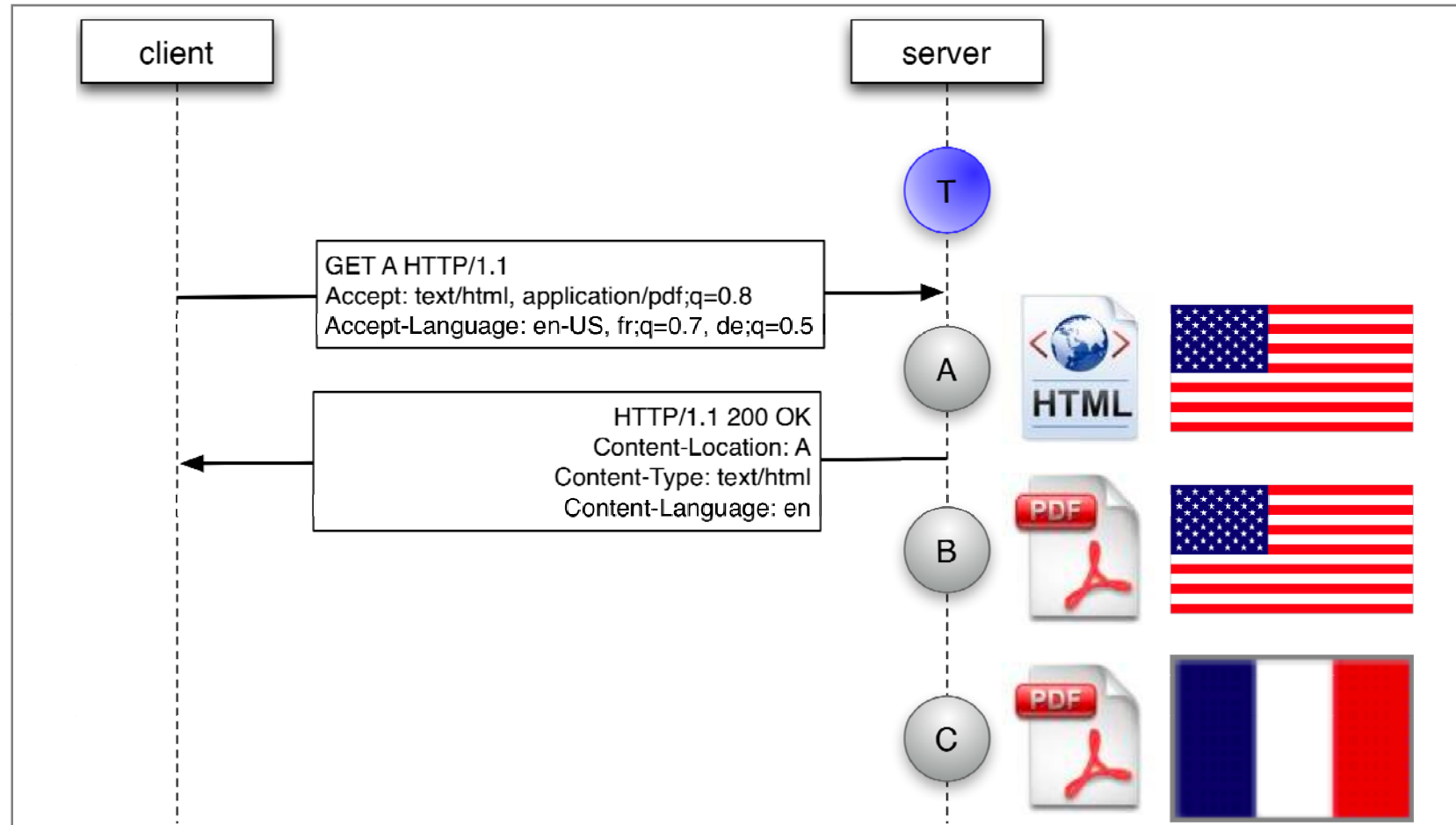
# GET with conneg on URI T – Server Choice – 200 OK



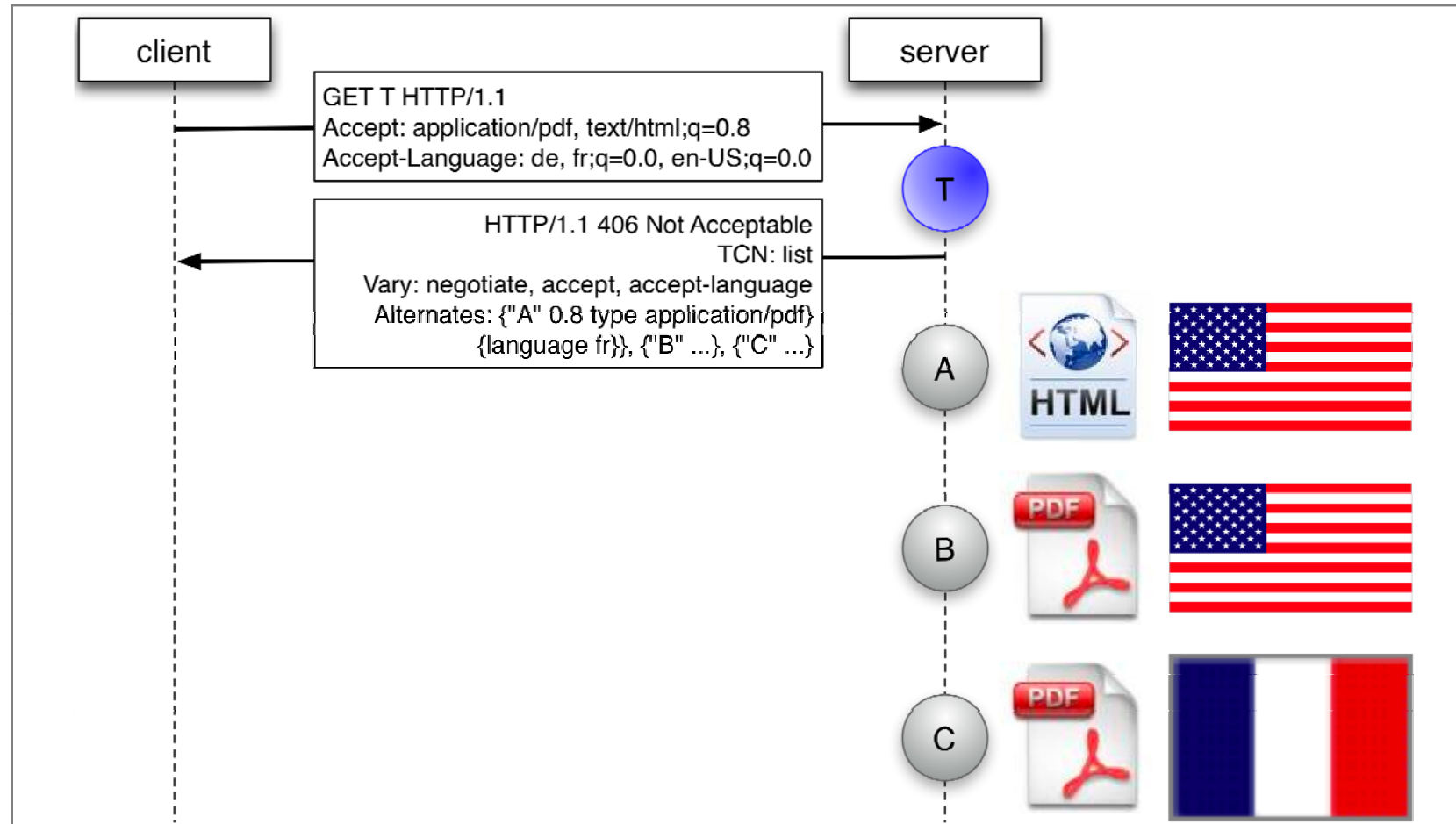
# GET with conneg on URI T – Server Choice – 302 Found – Step 1



## GET with conneg on URI T – Server Choice – 302 Found – Step 2



# GET with conneg on URI T – Server List – 406 Not Acceptable





# The Memento Solution

*Now, we are ready to introduce the components of the Memento Solution:*

- *Content Negotiation in the datetime dimension.*
- *An API for archives that allows requesting a list of all archived versions it holds for a given URI.*



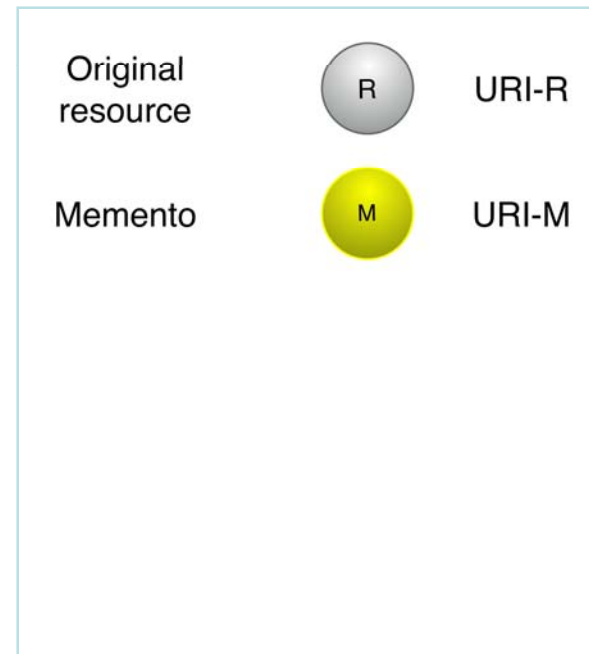
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# Terminology Intermission

*We introduce the term **Memento** to refer to an archived version of a resource.*

A Memento for a resource URI-R (as it existed) at time  $t_i$  is a resource URI-M<sub>i</sub> [URI-R@ $t_i$ ] for which the representation at any moment past its creation time  $t_c$  is the same as the representation that was available from URI-R at time  $t_i$ , with  $t_c \leq t_i$ . Implicit in this definition is the notion that, once created, a Memento always keeps the same representation.



# DT-conneg: Content Negotiation in the datetime dimension

- RFC 2295 introduces conneg in the following dimensions: media type, language, compression, character set, e.g.:

Accept-Language: en-US

- Memento introduces conneg in the datetime dimension:

X-Accept-Datetime: {Mon, Oct 12 2009  
14:20:33 GMT}

- This means that *somewhere*, we will need transparently negotiable resources to get to appropriate Mementos.
- This will be discussed for 2 classes of servers.



# Class 1 Servers: With Internal Archival Capabilities

- This type includes:
  - Content Management Systems
  - Version Control Systems
  - TTAapache
  - Servers that archive resource representations in the cloud and keep track of the URIs and datetimes of remotely archived resources.
- These servers have all the essential information (URI-Ms, and associated datetimes) to respond to a DT-conneg request.



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Dec 20 2001, 4:51:00 UTC

current



[http://en.wikipedia.org/wiki/September\\_11\\_attacks](http://en.wikipedia.org/wiki/September_11_attacks)

Dec 31 2004, 20:46:00 UTC



Dec 20 2008, 22:21:00 UTC

[http://en.wikipedia.org/w/index.php?title=September\\_11\\_attacks&oldid=259237305](http://en.wikipedia.org/w/index.php?title=September_11_attacks&oldid=259237305)



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original  
resource



Mementos



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original  
resource

DT-conneg with URI-R to get URI-M



Mementos



transparently  
negotiable  
resource



variant  
resources



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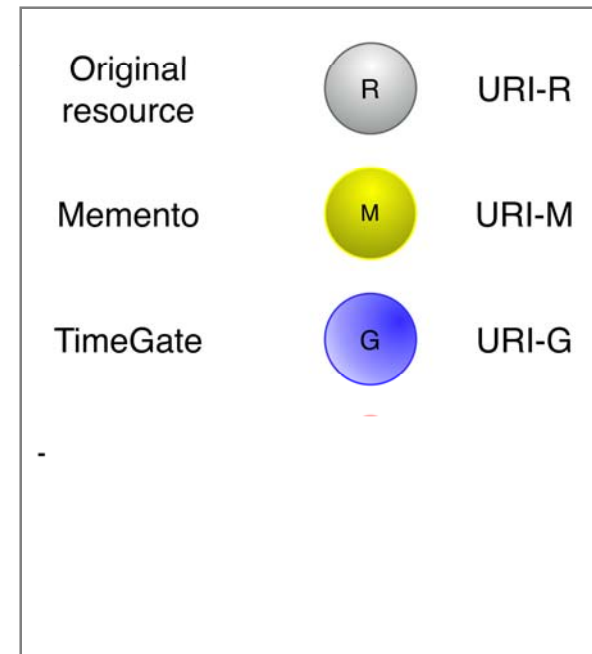




# Terminology Intermission

*We introduce the term `TimeGate` to refer to a transparently negotiable resource that supports the datetime dimension.*

A TimeGate for an original resource URI-R is a transparently negotiable resource URI-G[URI-R] for which all variant resources are Mementos URI-M<sub>i</sub>[URI-R@t<sub>i</sub>] of the resource URI-R. Since multiple archives may host versions of URI-R, multiple TimeGates may exist for any given resource, i.e. one per archive.





original  
resource



transparently  
negotiable  
resource

TimeGate



same

DT-conneg with URI-G/URI-R to get URI-M



Mementos



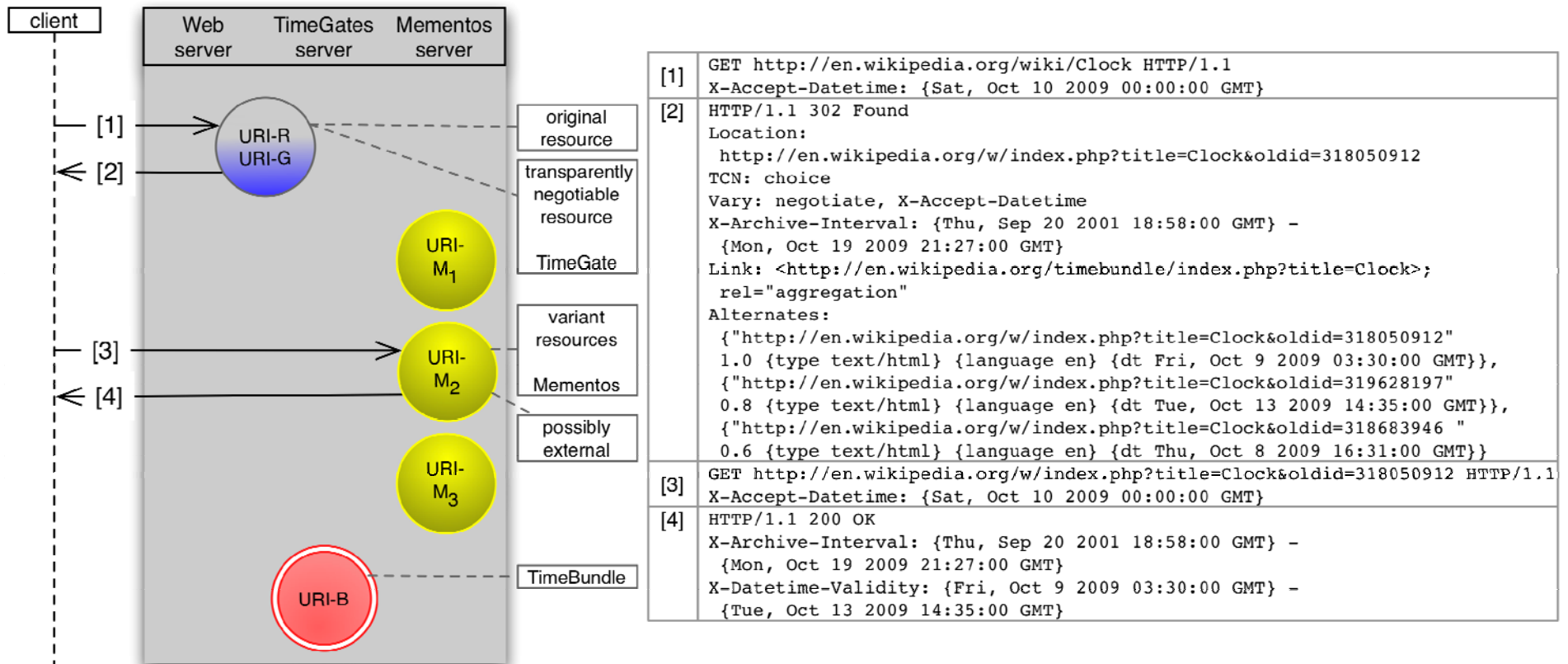
variant  
resources



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# Servers With Internal Archival Capabilities: Successful Flow



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# Servers With Internal Archival Capabilities: Other Scenarios

|        |  |
|--------|--|
| [1]    | Client issues request without datetime content negotiation against original resource URI-R that functions as its own TimeGate: |
|        | GET URI-G HTTP 1.1   |
| [2]    | Server that is the target of request [1] responds:   |
|        |  |
| Case 1 | URI-R exists.  |
|        | HTTP/1.1 200 OK<br>Content-Location: URI-R   |
| Case 2 | URI-R does not exist.  |
|        | HTTP/1.1 404 Not Found   |

|        |  |
|--------|--|
| [3]    | Client issues datetime content negotiation request against Memento URI-M for original resource URI-R:  |
|        | GET URI-M HTTP 1.1<br>X-Accept-Datetime: {datetime_j}  |
| [4]    | Memento server (same as server of original resource URI-R) that is the target of request [3] responds:   |
|        |  |
| Case 1 | Server detects X-Accept-Datetime & URI-M exists.   |
|        | HTTP/1.1 200 OK<br>Content-Location: URI-M<br>X-Archive-Interval: {datetime_start} - {datetime_end}<br>X-Datetime-Validity: {datetime_first} - {datetime_last} |
| Case 2 | Server detects X-Accept-Datetime & URI-M does not exist.   |
|        | HTTP/1.1 404 Not Found   |
| Case 3 | Server does not detect X-Accept-Datetime & URI-M exists.   |
|        | HTTP/1.1 200 OK<br>Content-Location: URI-M   |
| Case 4 | Server does not detect X-Accept-Datetime & URI-M does not exist.   |
|        | HTTP/1.1 404 Not Found   |

See <http://www.mementoweb.org/guide/http/local>

|     |   |
|-----|---|
| [3] | Client issues request without datetime content negotiation against Memento URI-M for original resource URI-R: |
|     | GET URI-G HTTP 1.1  |



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## Class 2 Servers: Without Internal Archival Capabilities

- This type includes:
  - Servers that are crawled by a web archive
  - Servers with an associated transactional archive
- These servers do not have the essential information (URI-Ms, and associated datetimes) to respond to a DT-conneg request.
- But they can still be really constructive by redirecting (HTTP 302) a client to an archive that can respond to the DT-conneg request.



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Oct 04 2009, 12:00:01 UTC

current



<http://lanlsource.lanl.gov/hello>

Oct 10 2009, 12:00:03 UTC



Oct 21 2009, 12:00:01 UTC



<http://mementoarchive.lanl.gov/store/ta/20091021120001/http://lanlsource.lanl.gov/hello>

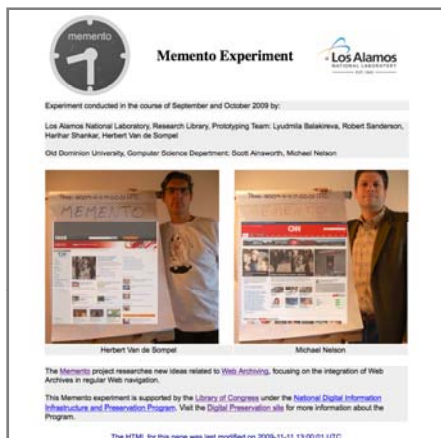


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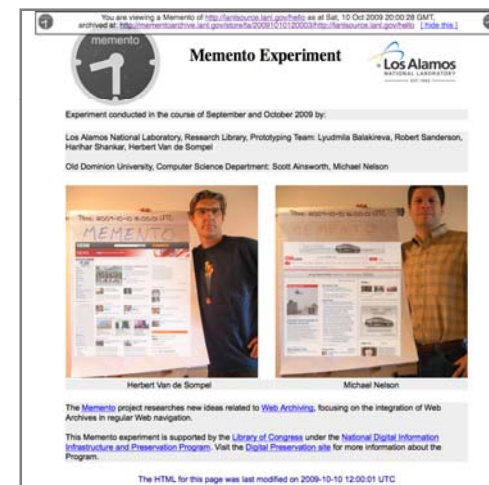




original  
resource



Mementos

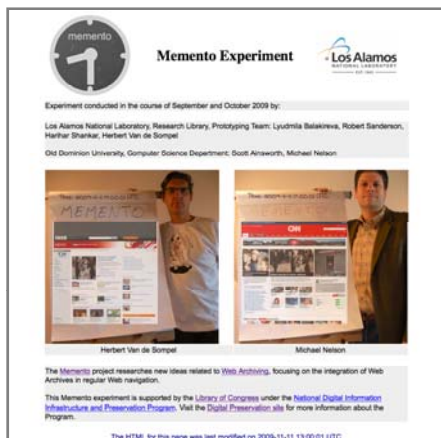


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original  
resource



TimeGate

transparently  
negotiable  
resource

← DT-conneg with URI-G to get URI-M →



Mementos

variant  
resources



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original  
resource

redirect



TimeGate

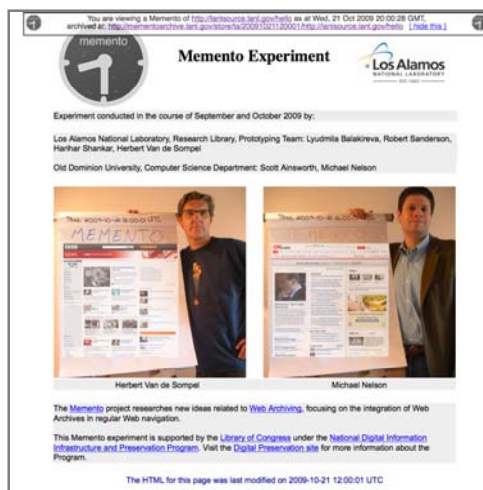
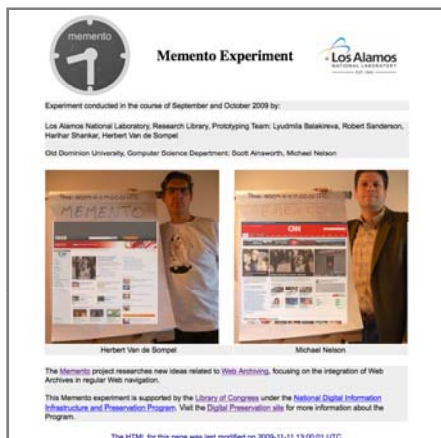
transparently  
negotiable  
resource

DT-conneg with URI-G to get URI-M



Mementos

variant  
resources



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# How to redirect from Original Resource to its (external) TimeGate

- Q1: Which archive to redirect to?
  - The archive with the best coverage for the server at hand.
    - There are quite a few nuances, here.
  - Always redirect to an Aggregator (see later)
- Q2: What is the TimeGate URI-G for URI-R on the chosen archive?
  - Convention for syntax of URI-G as function of URI-R.
    - <http://web.archive.org/web/timagate/http://cnn.com>
  - Always redirect to an Aggregator (see later)

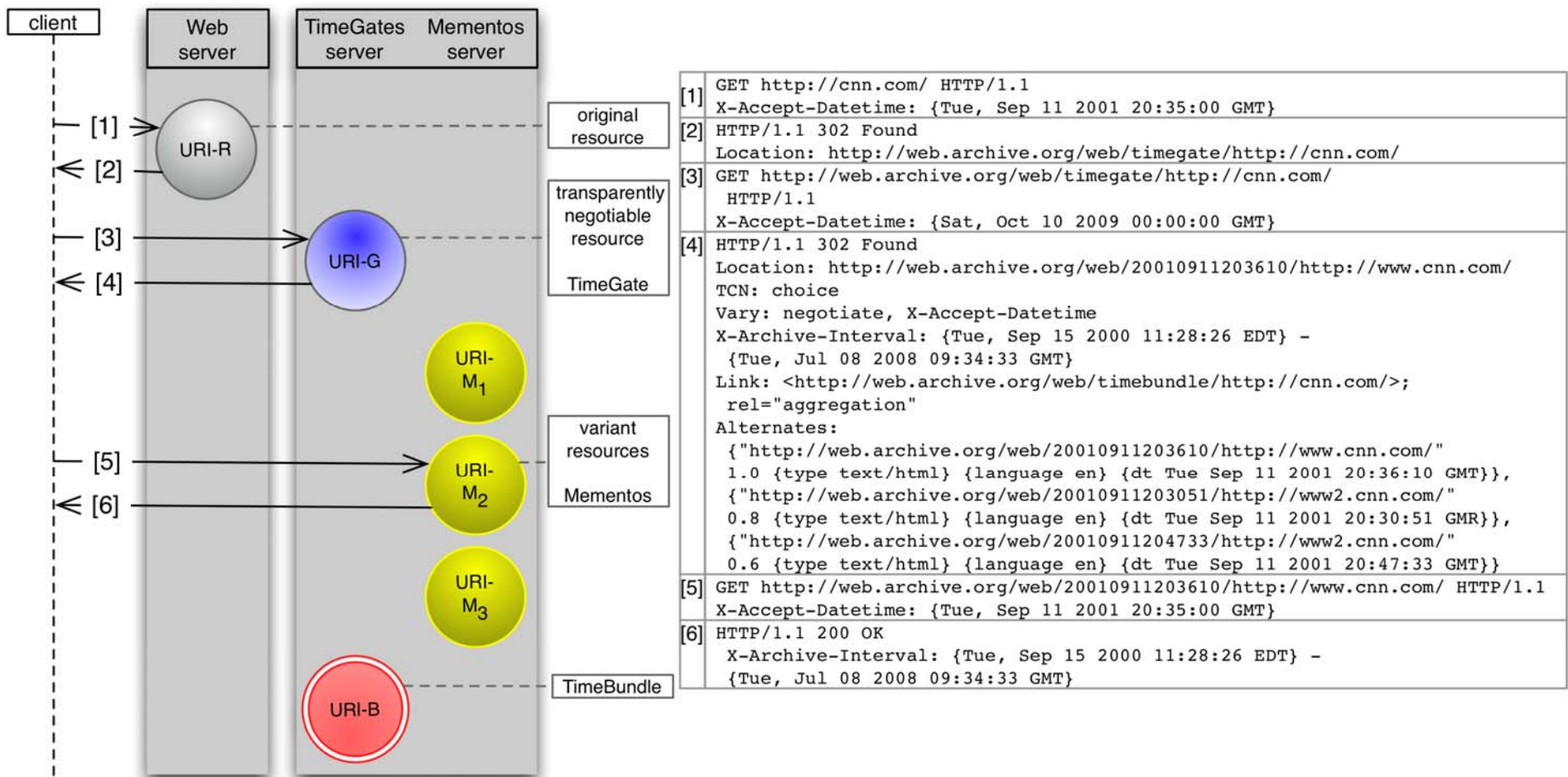


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# Servers Without Internal Archival Capabilities: Successful Flow



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# Servers Without Internal Archival Capabilities: Other Scenarios

|        |  |
|--------|--|
| [3]    | Client issues datetime content negotiation request against TimeGate URI-G for original resource URI-R:   |
|        | GET URI-G HTTP 1.1<br>X-Accept-Datetime: {datetime_j}  |
| [4]    | TimeGate server that is the target of request [3] responds:  |
| Case 1 | TimeGate server detects X-Accept-Datetime & URI-G exists & datetime can be parsed & datetime is in range for which server has Mementos for original resource URI-R.  |
|        | HTTP/1.1 302 Found<br>Location: URI-Mj<br>Vary: negotiate, X-Accept-Datetime<br>TCN: choice<br>Alternates: {URI-Mi {dt datetime_i}}, {URI-Mk {dt datetime_k}}<br>X-Archive-Interval: {datetime_start} - {datetime_end}<br>Link: URI-B; rel="aggregation" |
| Case 2 | TimeGate server detects X-Accept-Datetime & URI-G exists & datetime can be parsed & datetime is outside range for which server has   |
|        | HTTP/1.1 406 Not Acceptable<br>Vary: negotiate, X-Accept-Datetime<br>TCN: list<br>Alternates: {URI-Mi {dt datetime_i}}, {URI-Mk {dt datetime_k}}<br>X-Archive-Interval: {datetime_start} - {datetime_end}<br>Link: URI-B; rel="aggregation"              |
| Case 3 | TimeGate server detects X-Accept-Datetime & URI-G exists & datetime cannot be parsed.  |
|        | HTTP/1.1 400 Bad Request<br>X-Archive-Interval: {datetime_start} - {datetime_end}<br>Link: URI-B; rel="aggregation"  |
| Case 4 | TimeGate server detects X-Accept-Datetime & URI-G does not exist.  |
|        | HTTP/1.1 404 Not Found   |
| [3]    | Client issues request without datetime content negotiation against TimeGate URI-G for original resource URI-R:   |
|        | GET URI-G HTTP 1.1   |
| [4]    | TimeGate server that is the target of request [3] responds:  |

See <http://www.mementoweb.org/guide/http/remote>



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# HTTP Response Headers for DT-conneg: Datetime Ranges

- `X-Archive-Interval`: Indicates the entire datetime interval for which the archival server has Mementos for URI-R.
- `X-Datetime-Validity`: Indicates the datetime interval during which the provided representation was valid.
  - Can reliably be provided by transactional archives, CMS, ...
  - Can typically not reliably be provided by crawler-based archives.



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# The Memento Solution

*We have covered this component of the Memento Solution:*

- *Content Negotiation in the datetime dimension.*

*Now up to the next one:*

- *An API for archives that allows requesting a list of all archived versions it holds for a given URI.*



# Why an API?

- Mementos for any given URI-R are distributed across archives.

- In order to get a correct perspective of available Mementos, different archives need to be consulted.

- Can do so in distributed consultation mode (sloooow), or by consulting an aggregator.

## Archive-It

### September 8 2005, 17:48:47 GMT

You are viewing an archived web page, collected at the request of Internet Archive using [Archive-It](#). This page was captured on 17:48:47 Sep 08, 2005, and is part of the [Hurricane Katrina](#) collection. The information on this web page may be out of date. See [All versions of this archived page](#). [ [Hide](#) ]

• Collage depicting fish, ships, satellites, ocean, maps, boats, seas, hurricanes – with the NOAA and Commerce Department Logos.

Thu September 08 2005 Home Contacts Media Disclaimer Search People Location

Emergency Information for NOAA Employees Affected by Hurricane Katrina  
Hurricane Katrina Information — Getting Help, Locating Others and More  
Banner — top story

**Site Map**  
(includes additional menu items)

NOAA RSS Feeds  
Latest NOAA Advisories (Alerts)  
NOAA National Hurricane Center  
NOAA Storm Tracker  
NOAA Storm Tracker — Details and Note (see pop-up)  
Click here for NOAA Earth Observing System  
Taking the Pulse of the Planet  
Your Local Forecast by City, State (not ZIP code)

**STORM WATCH**  
Current Watch/Warnings

NOAA satellite image of Hurricane Katrina's large eye  
NOAA issues space weather warning: powerful solar flare erupts; Katrina communications may have been affected — Forecasters at the NOAA Space Environment Center in Boulder, Colo., Wednesday observed one of the largest solar flares on record at 1:40 p.m. EDT. The forecasters are predicting significant solar eruptions in the coming days. Agencies impacted by space weather storms may experience disruptions over the next two weeks. These include spacecraft operations, electric power systems, high frequency communications and low-frequency navigation systems.  
Full Story Inside

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New NOAA Web Site Provides FAA with Month-by-Month Analysis of Thunderstorms  
Access NOAA — NOAA Employees Make a Difference

## Internet Archive

### September 8 2005, 21:07:05 GMT

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## Internet Archive

### September 9 2005, 01:58:48 GMT

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## Archive-It

### September 10 2005, 08:11:47 GMT

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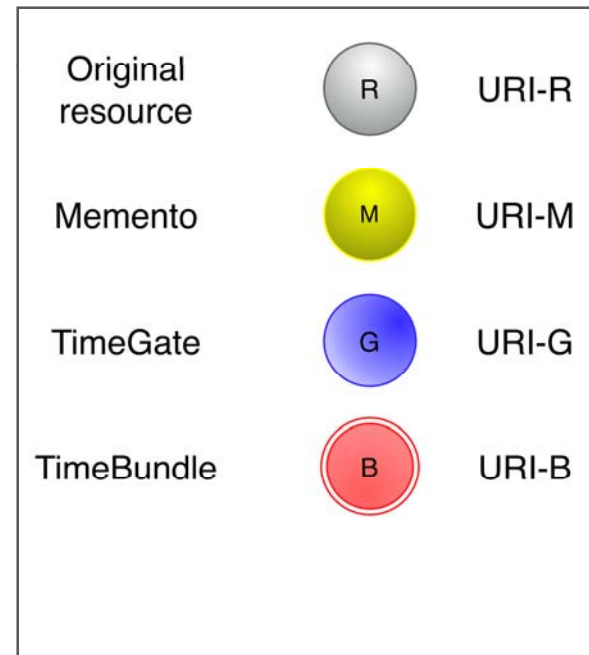


## Terminology Intermission

*We introduce the term `TimeBundle` to refer to a resource via which an overview of all Mementos for an original resource `URI-R` is available.*

A TimeBundle for a resource `URI-R`, is a resource `URI-B[URI-R]` that is an aggregation of:

- (a) All Mementos `URI-Mi [URI-R@ti]` available from an archive,
- (b) The archive's TimeGate `URI-G` for `URI-R`,
- (c) The original resource `URI-R` itself.





Original  
resource

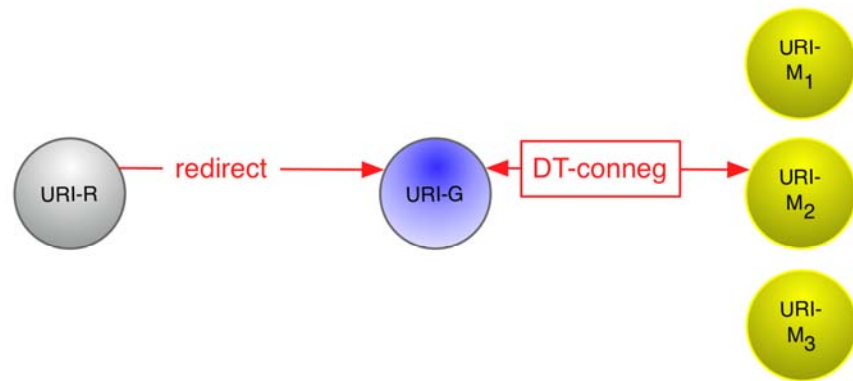


Memento



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OCLC DSS, Dublin, OH - November 18 2009





Original  
resource

TimeGate

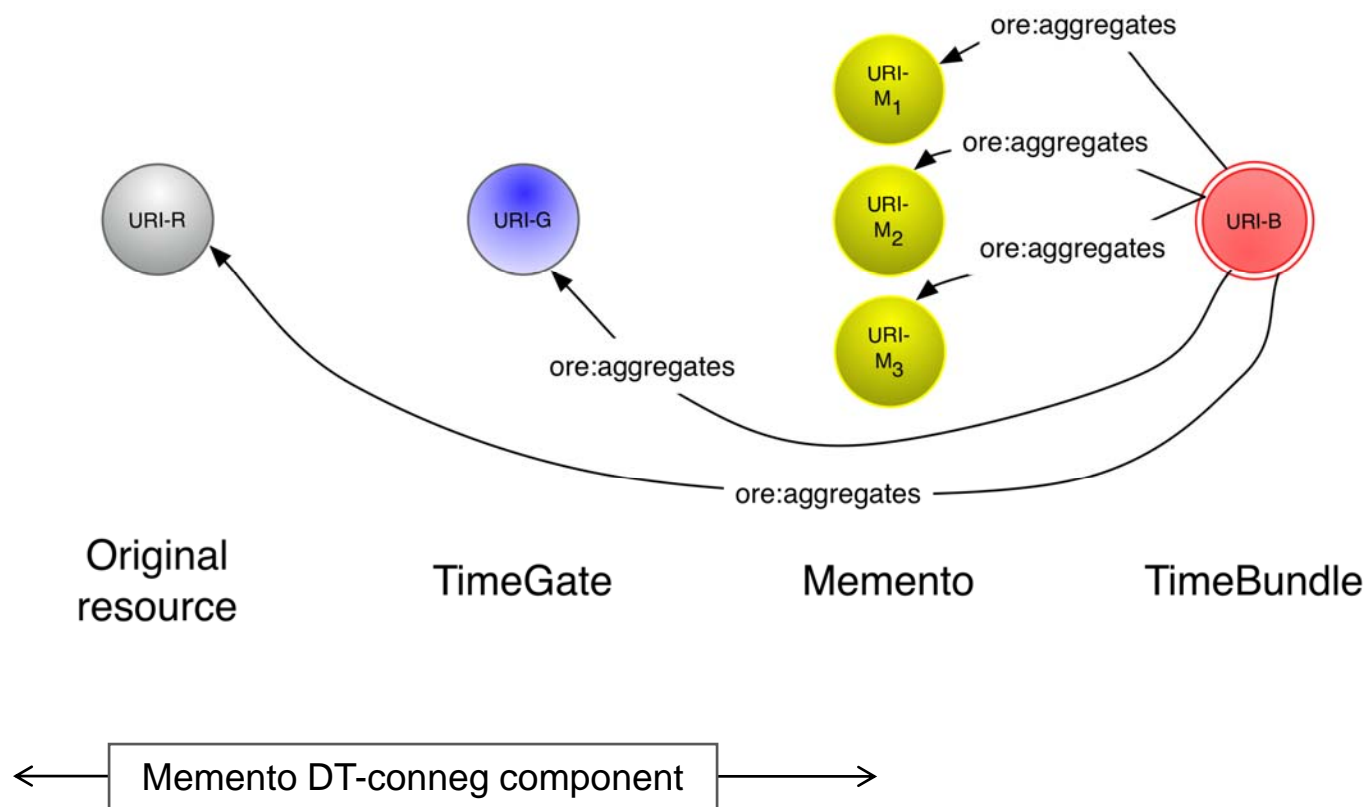
Memento

← Memento DT-conneg component →



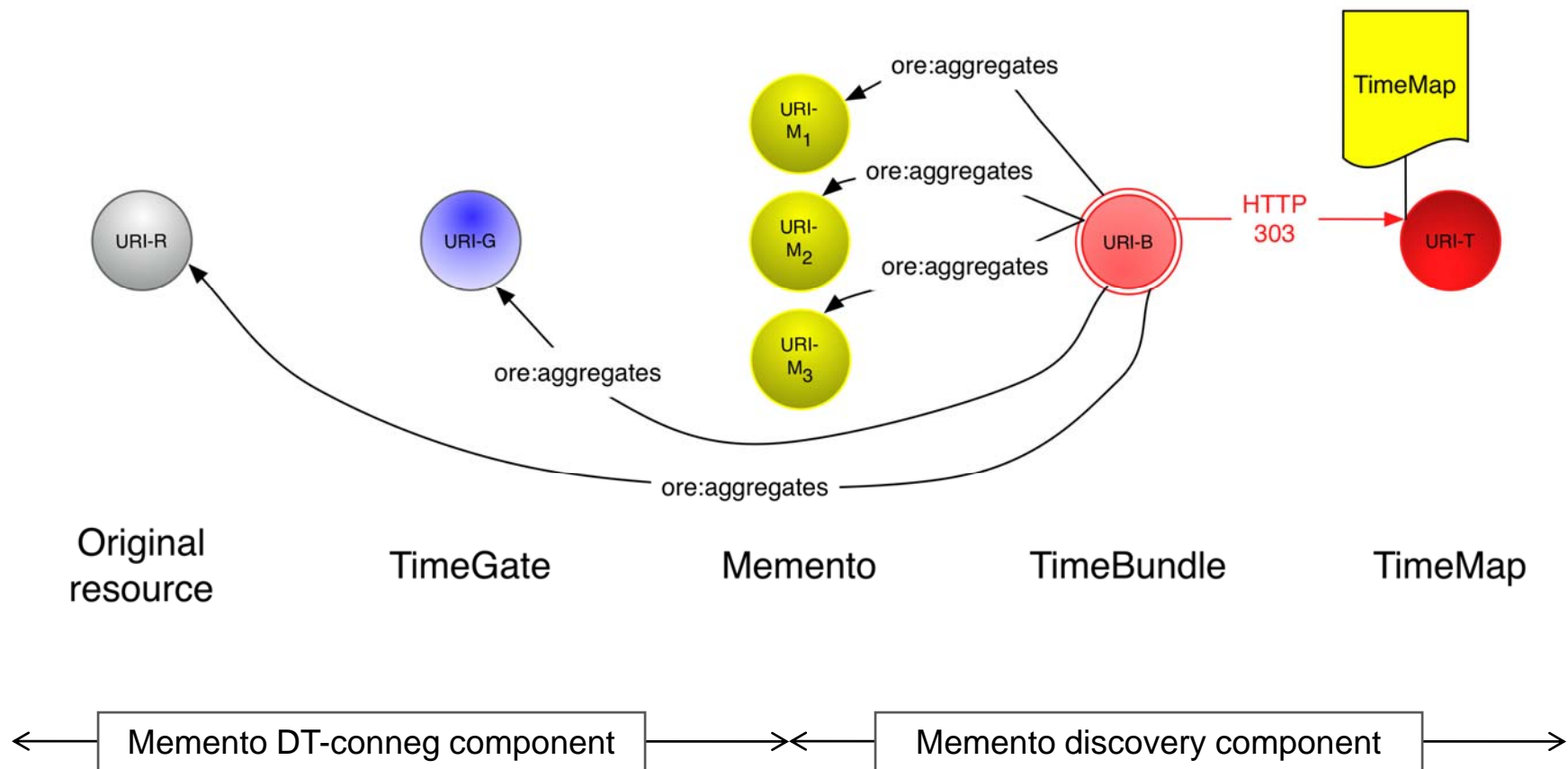
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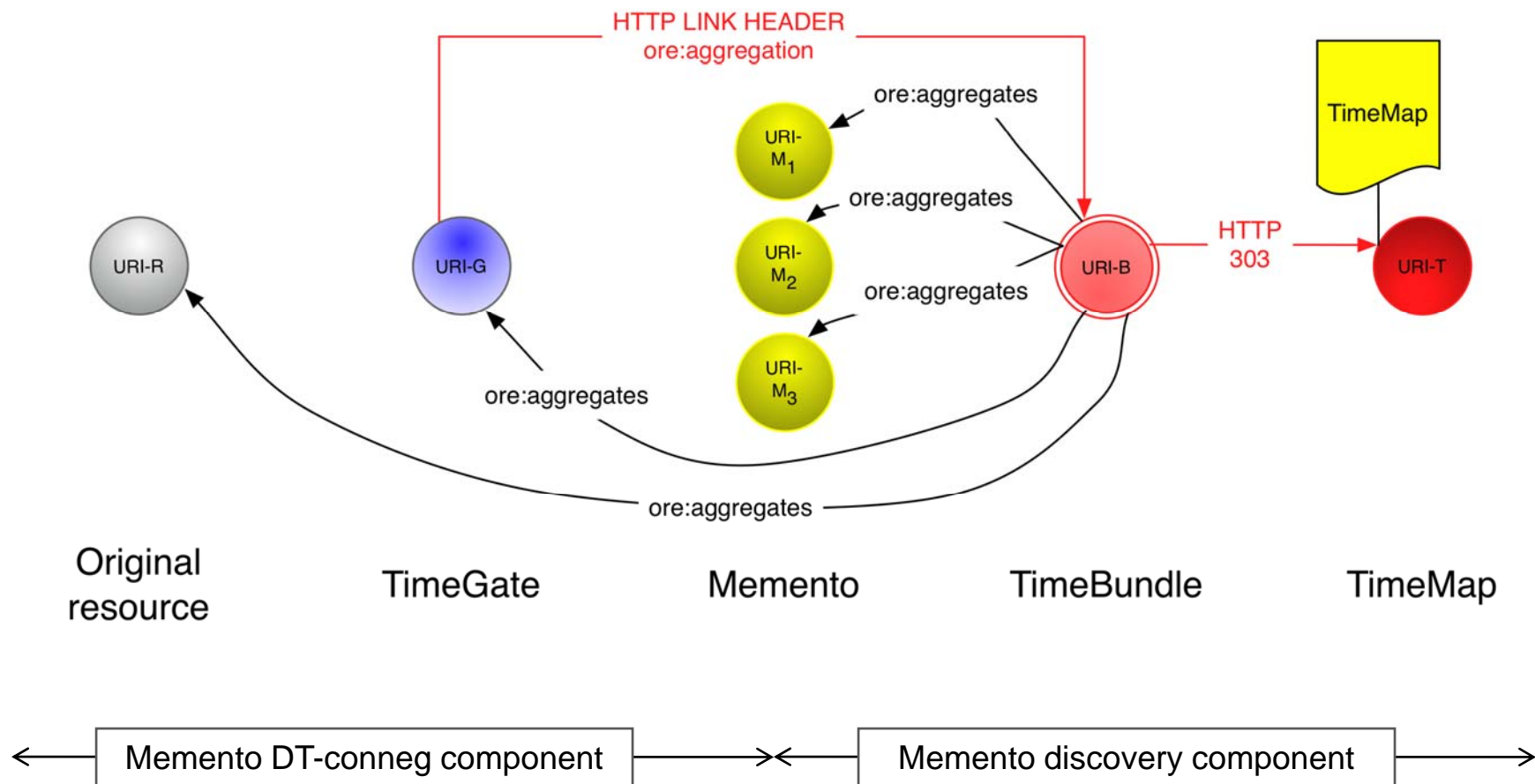




# HTTP Response Headers for DT-conneg: All Mementos

- Alternates: RFC 2295 requires listing all variant resources.
  - Impractical for DT-conneg: many variants may exist.
  - Alternates lists limited amount of variants, centered on the datetime requested by the client.
- Link: To compensate for the incomplete list of variants in Alternates, an HTTP Link header points to the TimeBundle via which a list is available of all variant resources (Mementos), and their associated metadata.
- Example TimeMap in RDF/XML:
  - <http://www.mementoweb.org/guide/api/map1.rdf>





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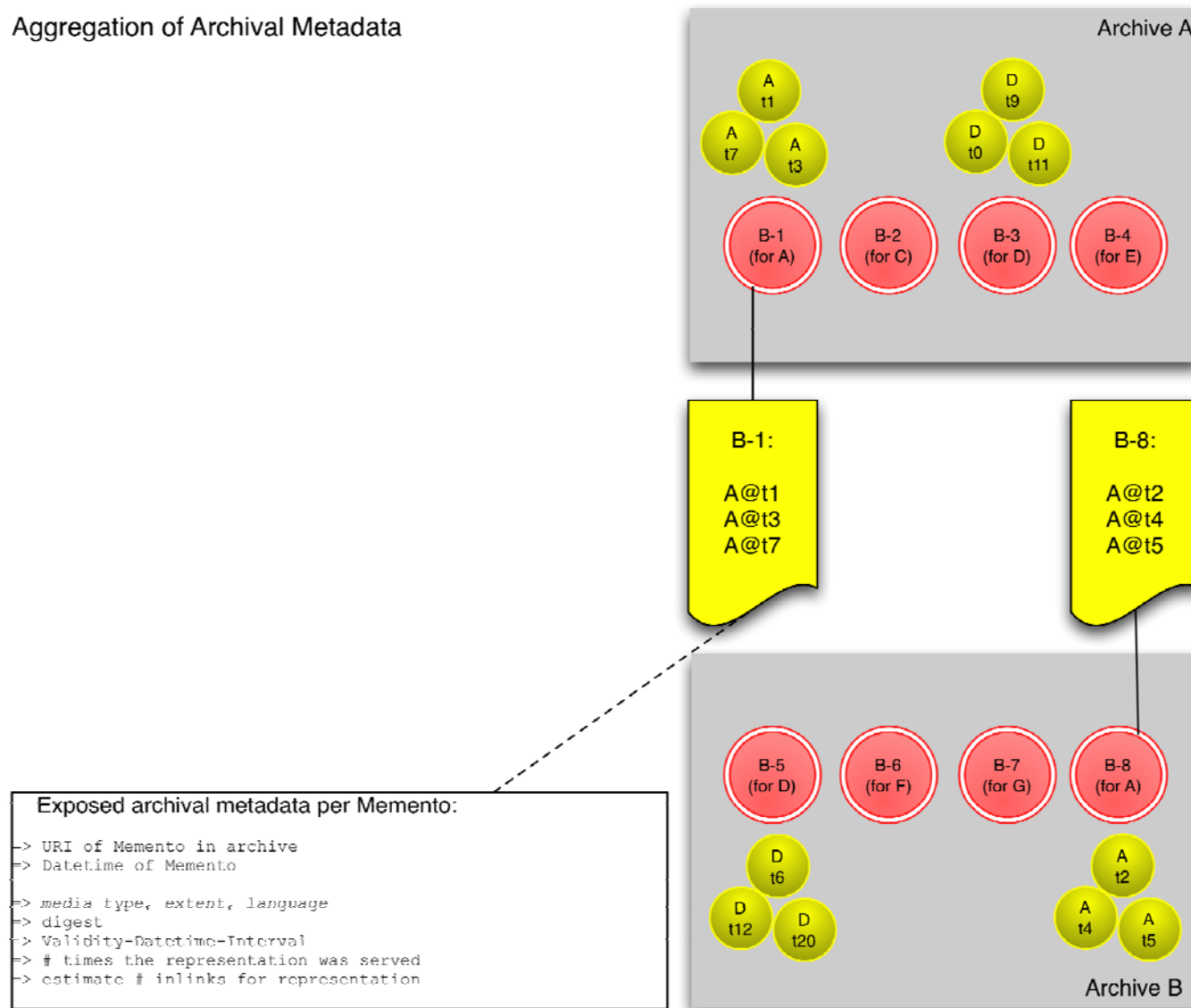


# All Mementos: For Discovery, Cross-Archive Services

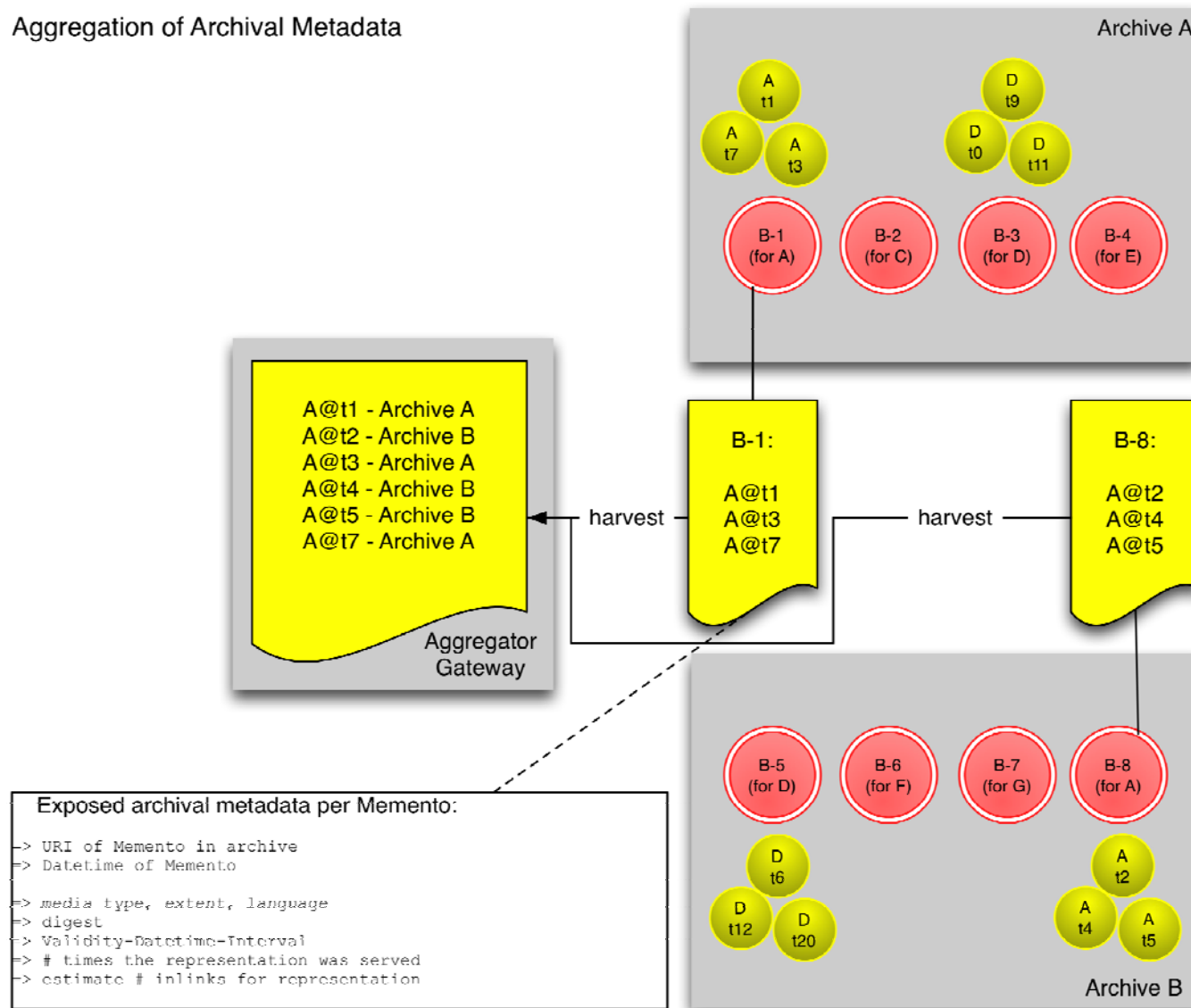
- Archive uses common approaches to make TimeBundles/TimeMaps discoverable:
  - SiteMaps,
  - Atom Feeds,
  - OAI-PMH.
- Aggregator harvests and merges TimeMaps. Based on this information, the Aggregator exposes its own TimeGates.
  - Cross-archive
  - Finer datetime granularity
  - Better chances of matching a client's datetime preference.
  - Can become a shared target for redirection for many web servers.



## Aggregation of Archival Metadata

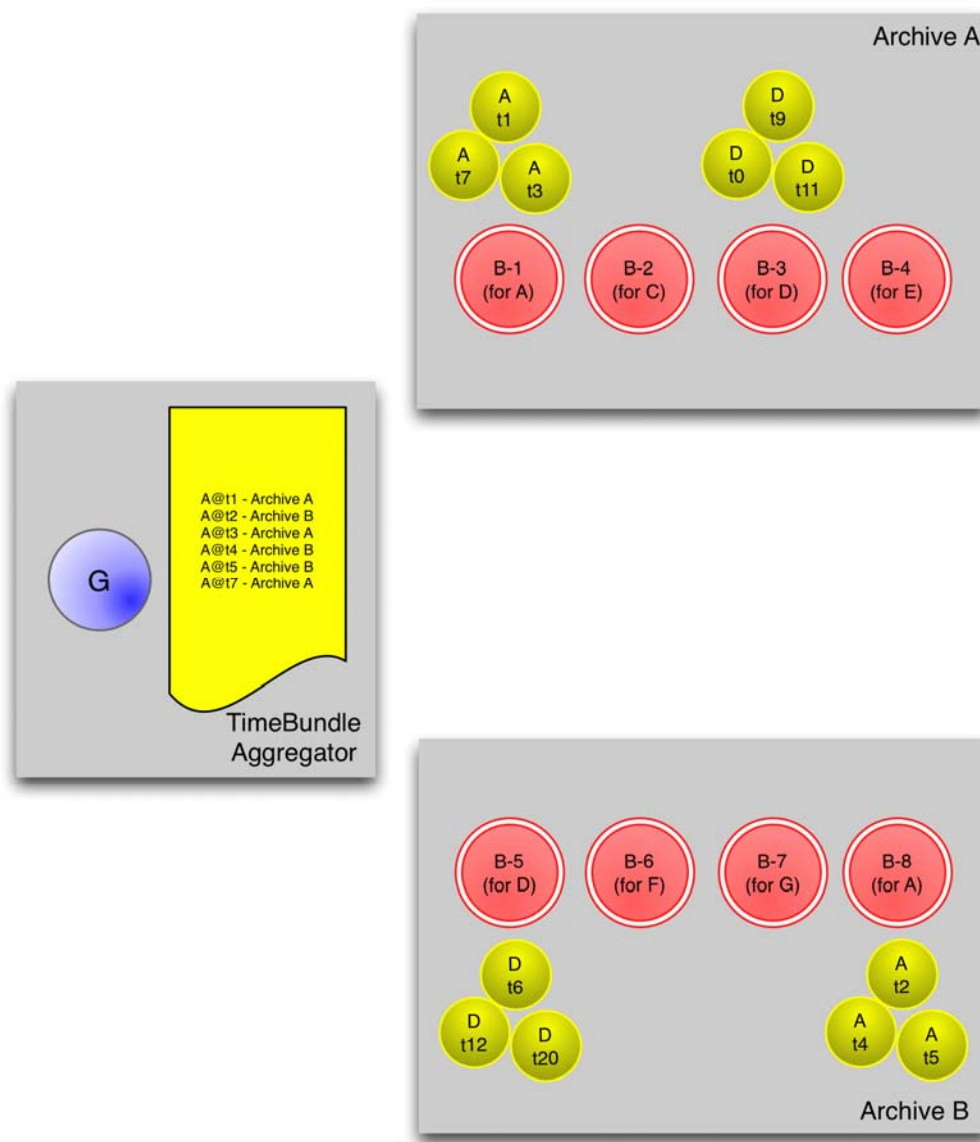


## Aggregation of Archival Metadata





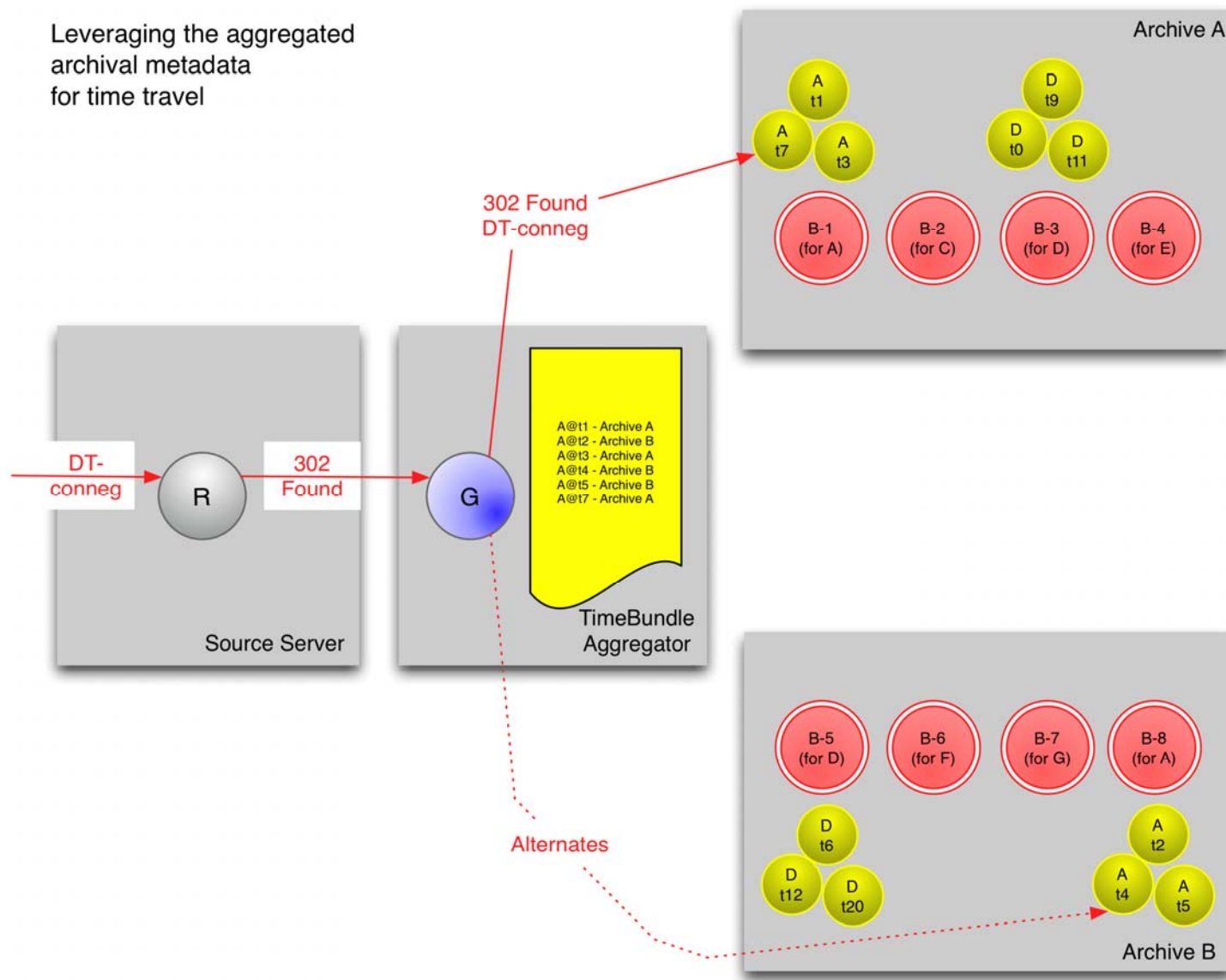
Leveraging the aggregated  
archival metadata  
for time travel



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Leveraging the aggregated  
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# The Memento Solution

*We have covered both components of the Memento Solution:*

- *Content Negotiation in the datetime dimension.*
- *An API for archives that allows requesting a list of all archived versions it holds for a given URI.*

*Up to some show-off now ...*

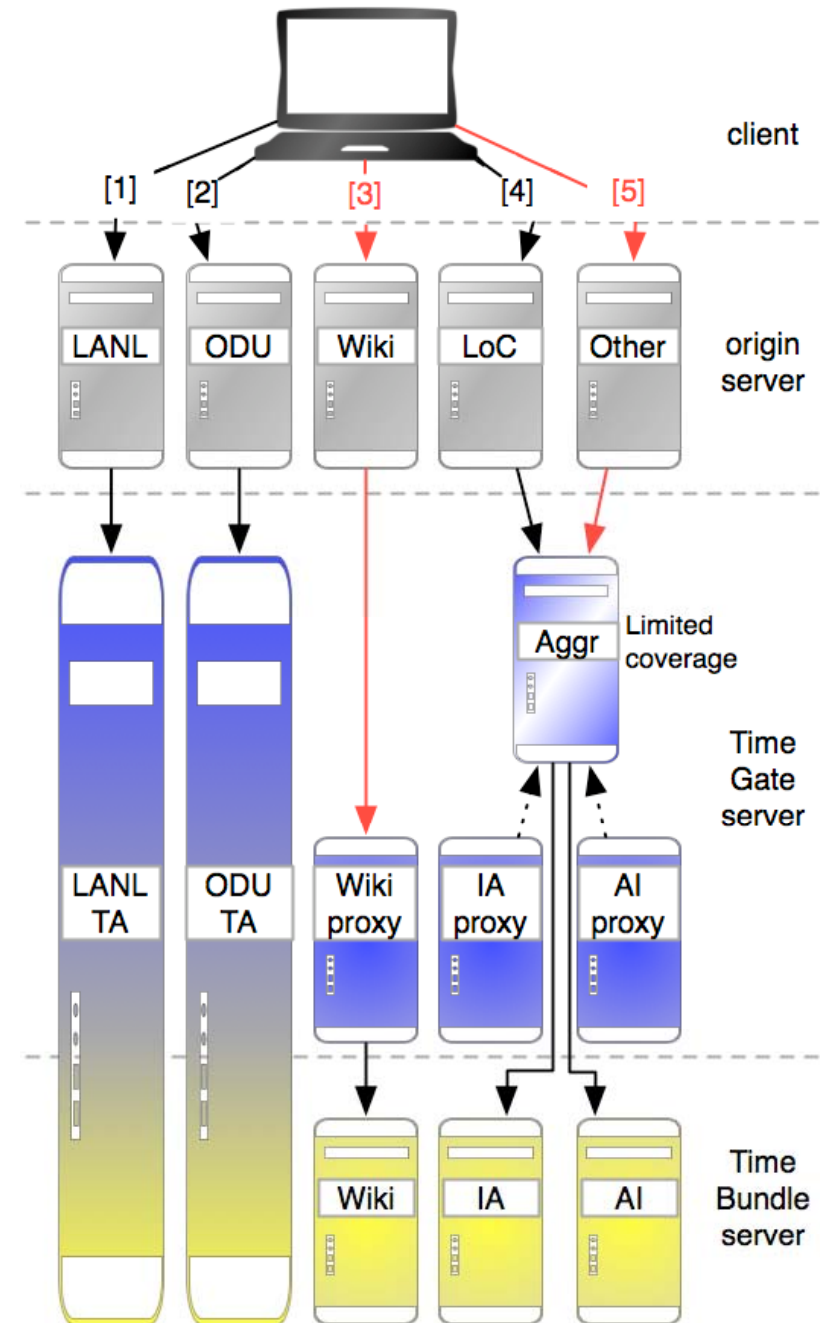


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# The Memento Experiment

- Servers at LANL and ODU:
  - Support of 302 redirect upon detection of DT-conneg header
  - Redirection is to respective transactional archive per server. These servers support TimeGates, TimeBundles
- Great illustration of the distributed nature of the Memento approach.



current

<http://lanlsource.lanl.gov/hello>



## Memento Experiment



Experiment conducted in the course of September and October 2009 by:

Los Alamos National Laboratory, Research Library, Prototyping Team: Lyudmila Balakireva, Robert Sanderson, Harihar Shankar, Herbert Van de Sompel

Old Dominion University, Computer Science Department: Scott Ainsworth, Michael Nelson

current

<http://lanlsource.lanl.gov/pics/picoftheday.png>



Herbert Van de Sompel



Michael Nelson

current

<http://odusource.cs.odu.edu/pics/picoftheday.png>

The **Memento** project researches new ideas related to [Web Archiving](#), focusing on the integration of Web Archives in regular Web navigation.

This Memento experiment is supported by the [Library of Congress](#) under the [National Digital Information Infrastructure and Preservation Program](#). Visit the [Digital Preservation site](#) for more information about the Program.

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Oct 04 2009, 22:12:33 UTC

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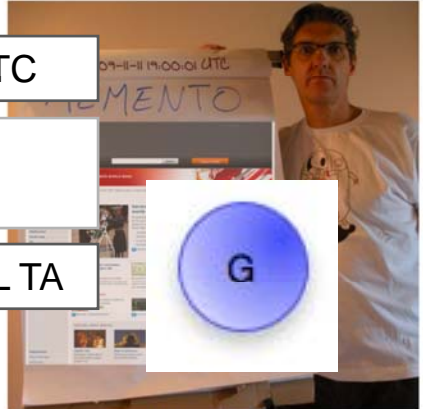
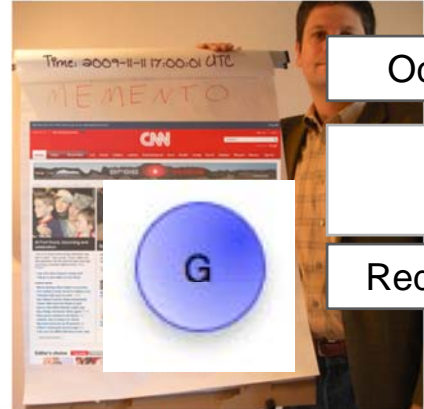
Redirect to TimeGate LANL TA

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<http://odusource.cs.odu.edu/pics/picoftheday.png>

Redirect to TimeGate ODU TA



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1 You are viewing a Memento of <http://lanlsource.lanl.gov/hello> as at Sun, 04 Oct 2009 20:00:28 GMT, archived at: <http://mementoarchive.lanl.gov/store/ta/20091004120001/http://lanlsource.lanl.gov/hello> [hide this] 1

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<http://mementoarchive.lanl.gov/store/ta/20091004180135/http://lanlsource.lanl.gov/pics/picoftheday.png>

<http://mementoarchive.cs.odu.edu/store/ta/20091004160013/http://odusource.cs.odu.edu/pics/picoftheday.png>

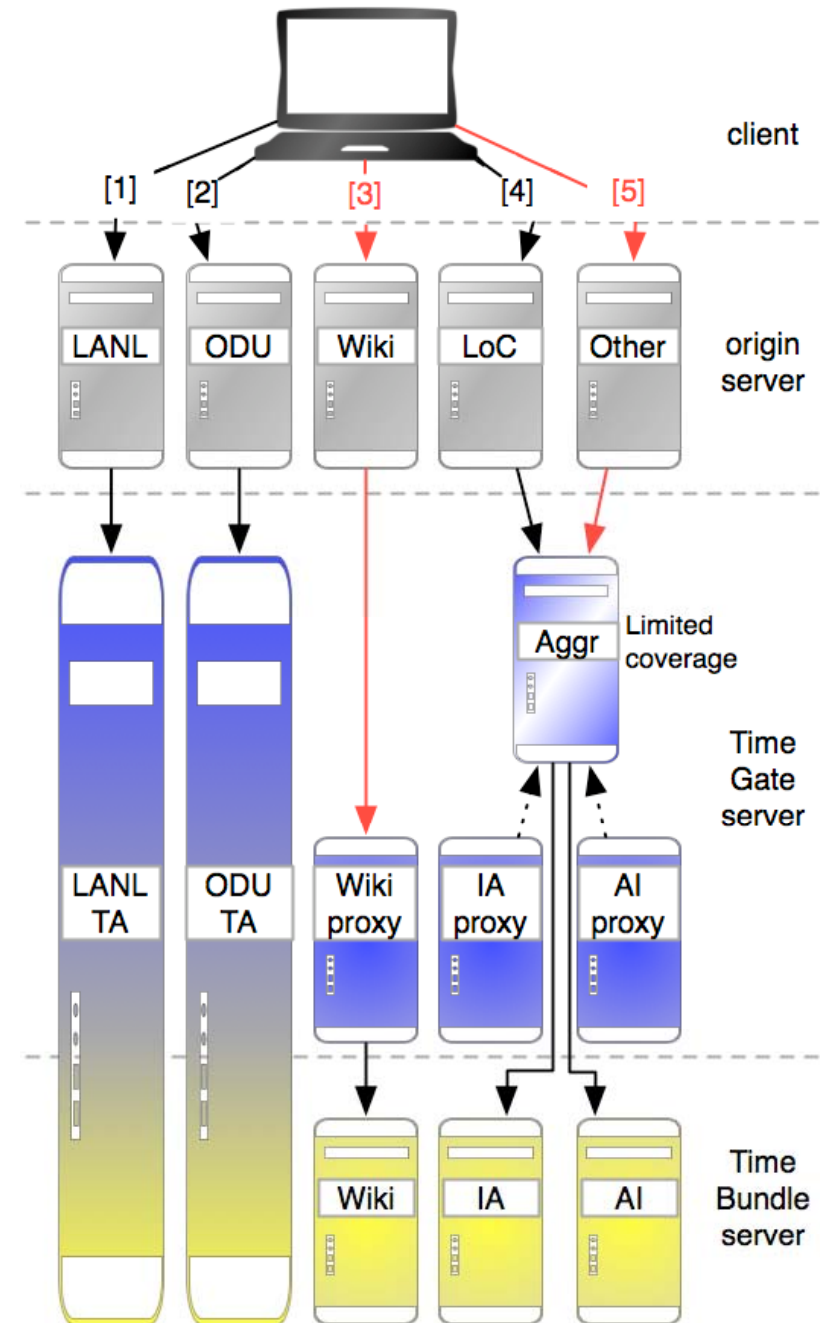


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- Servers at Library of Congress:
  - Support of 302 redirect upon detection of DT-conneg header
  - Redirection is to an aggregator that support TimeGates, TimeBundles.
  - Aggregator collects (dynamically, screen scraping) metadata from IA, Archive-It, WebCite, Canadian Archive.





current

<http://digitalpreservation.gov>

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FEEDBACK



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Government Computer News has named NDIIPP as one of the top federal information technology projects of 2009.

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Prominent technologists shared their experiences at the SunPASIG

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OCLC DSS, Dublin, OH - November 18 2009



Oct 04 2009, 22:12:33 UTC

<http://digitalpreservation.gov>

Redirect to TimeGate Aggregator

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The Library of Congress Digital Preservation

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Sep 28 2009, 17:14:05 UTC

<http://digitalpreservation.gov>

Archived web page, collected at the request of Lori Donovan using [Archive-It](#). This page was archived on 17:14:05 Sep 28, 2009, and is part of the [K-12 Sample Collection](#) collection. The information on this web page may be out of date. See [All versions](#) of this archived page. [ [hide](#) ]

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# Digital PRESERVATION

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## || Meeting the Challenge ||



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## || NDIIPP Wins Award ||



### NDIIPP Wins Award

Government Computer News announced that NDIIPP is among the best of Federal information technology initiatives of 2009.

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### Best Practices Exchange '09

BPE featured presentations by NDIIPP partners and staff.

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### Federal News Radio Podcast

NDIIPP staff member Bill LeFurgy was interviewed by FNR about the DuraSpace pilot project.

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<http://wayback.archive-it.org/1610/20090928171405/http://www.digitalpreservation.gov>

V



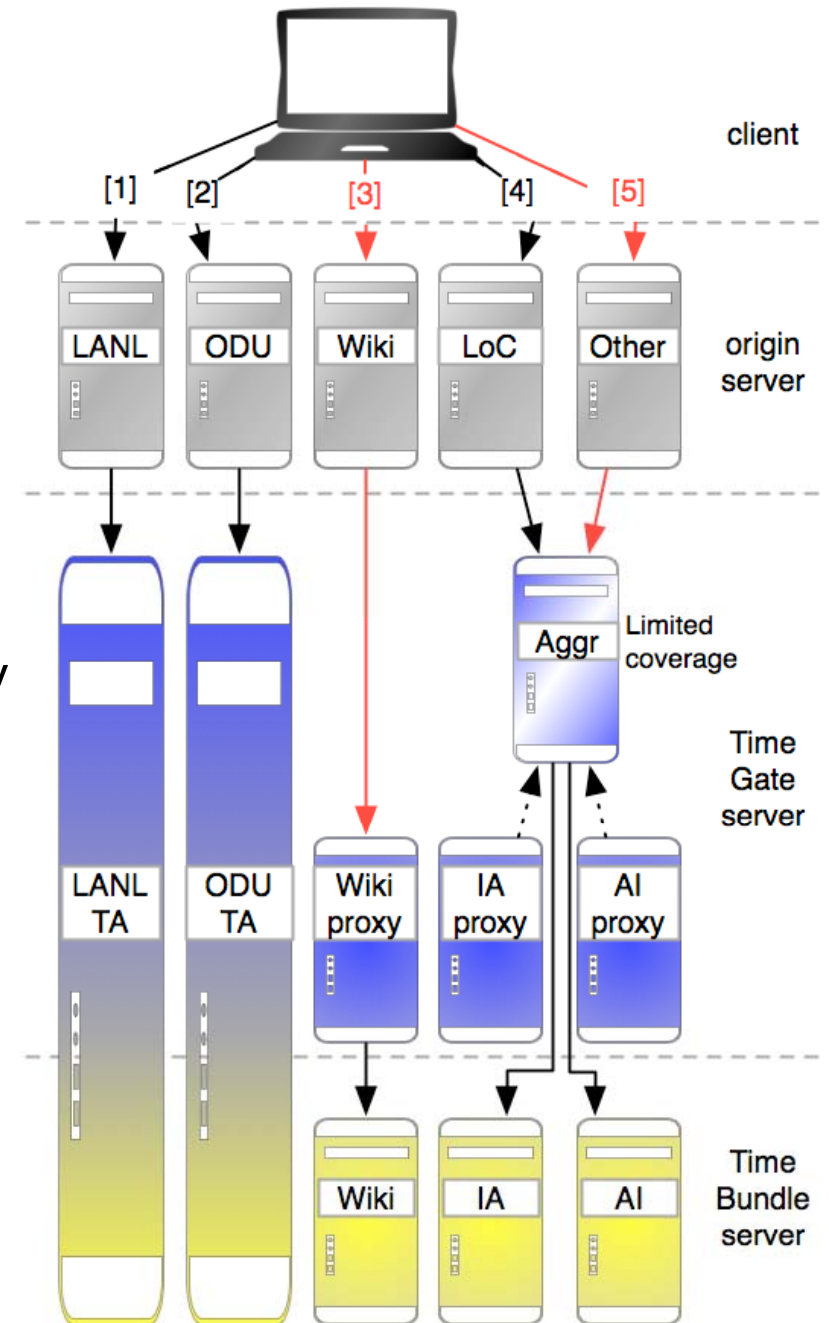
Memento: Time Travel for the Web  
Herbert Van de Sompel, Michael L. Nelson  
OCLC DSS, Dublin, OH - November 18 2009



# The Memento Experiment

- Wikipedia:
  - No support of 302 redirect upon detection of DT-conneg header
  - Memento client intercepts the “unexpected” 200 OK response.
  - Client requests from Wikipedia Proxy that supports TimeGates, TimeBundles.
  - TimeGate on Wikipedia Proxy redirects client to Memento in Wikipedia.
- Also created Memento plug-in for Mediawiki. Adoption currently under discussion.

<http://www.mediawiki.org/wiki/Extension:Memento>





current


<http://en.wikipedia.org/wiki/Clocks>

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# For your great, great, great, great grandson

**Clock**


From Wikipedia, the free encyclopedia  
(Redirected from [Clocks](#))

*For other uses, see [Clock \(disambiguation\)](#).*

A **clock** is an instrument used to indicate, measure, keep, and co-ordinate [time](#). The word *clock* is derived ultimately (via [Dutch](#), Northern French, and [Medieval Latin](#)) from the [Celtic](#) words *clagan* and *clocca* meaning "[bell](#)". For [horologists](#) and other specialists the term *clock* continues to mean exclusively a device with a [striking mechanism](#) for announcing intervals of time acoustically, by ringing a bell, a set of [chimes](#), or a [gong](#).<sup>[[dubious – discuss](#)]</sup> A silent instrument lacking such a mechanism has traditionally been known as a **timepiece**.<sup>[1]</sup> In general usage today a "clock" refers to any device for measuring and displaying the time. [Watches](#) and other timepieces that can be carried on one's person are often distinguished from clocks.<sup>[2]</sup>

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- 2 How clocks work
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Platform clock at [King's Cross railway station](#), London.

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OCLC DSS, Dublin, OH - November 18 2009





Nov 02 2007, 14:12:00 UTC

<http://en.wikipedia.org/wiki/Clocks>

Unexpected response.

Wikipedia

For your great, great, great, great grandson

clock

From Wikipedia, the free encyclopedia  
(Redirected from [Clocks](#))

*For other uses, see [Clock](#) (disambiguation).*

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Platform clock at King's Cross railway station, London.

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Nov 02 2007, 14:12:00 UTC

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Client requests directly from  
TimeGate at Wikipedia Proxy

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For other uses, see *Clock (disambiguation)*.

Platform clock at King's Cross railway station, London.

Royal Observatory Greenwich



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Oct 31 2007, 21:03:00 UTC

http://en.wikipedia.org/w/index.php?  
oldid=168376483


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## Clock

This is an **old revision** of this page, as edited by **Zginder** (talk | contribs) at 21:03, 31 October 2007. It may differ significantly from the **current revision**.  
(diff) ← Previous revision | Current revision (diff) | Newer revision → (diff)

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For other uses, see **Clock** (disambiguation).

A **clock** is an instrument for measuring and indicating the **time**. The word "clock" is derived ultimately (via **Dutch**, Northern French, and **Medieval Latin**) from the **Celtic** words *clagan* and *clocca* meaning "bell". For **horologists** and other specialists the term "clock" continues to mean exclusively a device with a **striking mechanism** for announcing intervals of time acoustically, by ringing a bell, a set of **chimes**, or a **gong**.<sup>[*citation needed*]</sup> A silent instrument lacking such a mechanism has traditionally been known as a **timepiece**.<sup>[1]</sup> In general usage today, however, a "clock" refers to any device for measuring and displaying the time which, unlike a **watch**, is not worn on the person.

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  - 2.1.2 Digital clocks
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3 Purposes



A platform clock at King's Cross railway station in London

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## Discussion: Memento and Lost Causes (1)

- URI-R vanishes, but the server that used to serve it is still operational:
  - In this case, the server should still issue the redirect to a TimeGate upon detection of the DT-conneg request.
  - This allows seamless access to a Memento of URI-R, even if the server no longer hosts the original.



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## Discussion: Memento and Lost Causes (2)

- A domain vanishes:
  - The client is looking for a current representation of URI-R that was hosted by the domain, but fails.
  - The client resorts to interaction with archives (or with a TimeBundle aggregator) and arrives at the most recent Memento of the resource.



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## Discussion: Memento and Lost Causes (3)

- A domain is taken over by a new custodian:
  - The new custodian adheres to other policies regarding which archive to redirect a DT-conneg request.
  - The client understands from the `X-Archive-Interval` returned by that archive of choice, that it does not cover the time range in which the previous custodian operated the domain.
  - The client resorts to interaction with other archives (or with a TimeBundle aggregator) and arrives at an appropriate Memento.



## Discussion: Memento and Caching

- Caches do not take `X-Accept-Datetime` header into account.
- Hence, in order to avoid retrieving current representation of URI-R, caches between client and server (included) must be bypassed when doing datetime content negotiation.
- Currently enforced by:
  - `Cache-Control: no-cache => force cache revalidation`
  - `If-Modified-Since: Thu, 01 Jan 1970 00:00:00 GMT => make sure that revalidation fails`
- Clearly needs a more elegant solution.



## Discussion: Memento and Web Archives

- Web Archives rewrite URLs in archived pages, in order to avoid:
  - Serving current representations of embedded resources;
  - Linking to current representations of resources
- The upside: Archived pages are self-contained.
- The downside: Cannot navigate beyond the archive's content, even if other archives may have archived version of embedded or linked resource.
- Would be interesting to explore novel strategies with this regard.



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## If You Think Memento is Cool ...

- Install Apache rewrite rule that redirects when X-Accept-Datetime is present.
  - <http://mementoweb.org/tools/apache>
- Implement Memento natively for a CMS platform.
  - <http://mementoweb.org/guide/http/local>
- Join memento-dev Google Group
  - <http://groups.google.com/group/memento-dev>
- Use ModifyHeaders FireFox extension to test.
- Watch video
  - <http://www.youtube.com/watch?v=LnkBp-FfoJw>
- Read paper
  - <http://arxiv.org/abs/0911.1112>
- Soon: Memento FireFox plug-in.



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# Memento wants to make Browsing the Past Easy



<http://www.mementoweb.org>



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