Memento: Time Travel for the Web

The Memento Team

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Memento is partially funded by the Library of Congress
Memento wants to make navigating the Web’s Past Easy

http://www.mementoweb.org
http://groups.google.com/group/memento-dev
Recap of the Basics …
W3C Web Architecture: Resource – URI - Representation

- URI
  - Identifies
  - dereference
  - Represents
  - Representation
W3C Web Architecture: Resource – URI - Representation

URI

Identifies

Resource

Represents

Representation 1

Represents

Representation 2

dereference

content negotiation
Problem Statement …
Resources
Resources have Representations
Resources have Representations that Change over Time
Only the Current Representation is Available from a Resource
Old Representations are Lost Forever

the old representations are lost forever
Archived Resources Exist

the old representations are lost forever

well, that is not not entirely true
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Archived Resources


Sep 11 2001, 20:36:10 UTC
Dec 20 2001, 4:51:00 UTC
Finding Archived Resources

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

Finding Archived Resources

Go to http://en.wikipedia.org/wiki/September_11_attacks and click History

Browse History

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Navigating Archived Resources


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

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Navigating Archived Resources


Current and Past Web are Not Integrated

- Current and Past Web based on same technology.
- But, going from Current to Past Web is a matter of (manual) discovery.
- Memento wants to make going from Current to Past Web a (HTTP) protocol matter.
- Memento wants to integrate Current And Past Web.
The Memento Approach …
Navigate the Web of the Past

http://en.wikipedia.org/wiki/Web_Archiving
Navigate the Web of the Past

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

Oct 11 2009, 05:30:33 UTC

Set browser time dial to …
Navigate the Web of the Past

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

Oct 11 2009, 05:30:33 UTC

From Wikipedia History

Oct 01 2009, 16:30:00 UTC

Set browser time dial to …
Navigate the Web of the Past

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

Oct 11 2009, 05:30:33 UTC

From Wikipedia History

Oct 01 2009, 16:30:00 UTC

Set browser time dial to ...

Robots Exclusion Protocol

Oct 11 2009, 05:30:33 UTC

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Navigate the Web of the Past


Oct 11 2009, 05:30:33 UTC

Browser time dial still at …
Navigate the Web of the Past

obots_exclusion_protocol

From Wikipedia History

Oct 11 2009, 05:30:33 UTC

Browser time dial still at …

Sep 15 2009, 20:49:00 UTC
Navigate the Web of the Past


Oct 11 2009, 05:30:33 UTC

Robots Exclusion

Sep 15 2009, 20:49:00 UTC

From Wikipedia History

Browser time dial still at …
Navigate the Web of the Past

http://www.robotstxt.org/

Oct 11 2009, 05:30:33 UTC

Browser time dial still at …
Navigate the Web of the Past

http://www.robotstxt.org/

Oct 11 2009, 05:30:33 UTC

Browser time dial still at …

From Internet Archive

Nov 09 2007, 06:21:04 UTC

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How does Memento achieve this?

There are two components to the Memento Solution:

- **Component 1**: Navigation towards an archived resource via its original resource, by leveraging content negotiation.

- **Component 2**: A discovery API for archives that allows requesting a list of all archived versions it holds for a resource with a given URI.
How does Memento achieve this?

- **Component 1**: Navigation towards an archived resource via its original resource, by leveraging content negotiation.
The Web without a Time Dimension

Original resource

HTTP GET → URI-R
The Web without a Time Dimension

- HTTP GET → URI-M₁
- HTTP GET → URI-M₂
- HTTP GET → URI-M₃

Archived resources
The Web without a Time Dimension

Need to use a different URI to access archived versions of a resource and its current version.
The Web with Time Dimension added by Memento

In Memento: use URI of the current version to access archived versions, but qualify it with datetime
The Web with Time Dimension added by Memento

... and magically arrive at an archived version
How does Memento achieve this?

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

HTTP GET on URI A

```
GET A HTTP/1.1
HTTP/1.1 200 OK
Content-Type: text/html
Content-Language: en
```
GET with conneg on URI T – Server Choice – 302 Found – Step 1

GET T HTTP/1.1
Accept: text/html, application/pdf;q=0.8
Accept-Language: en-US, fr;q=0.7, de;q=0.5

HTTP/1.1 302 Found
TCN: choice
Vary: negotiate, accept, accept-language
Location: A
Content-Type: text/html
Content-Language: en
Alternates: {"A" 1.0 {type text/html}
{languag en}}, {"B" ...}, {"C" ...}
GET with conneg on URI T – Server Choice – 302 Found – Step 2

GET A HTTP/1.1
Accept: text/html, application/pdf;q=0.8
Accept-Language: en-US, fr;q=0.7, de;q=0.5

HTTP/1.1 200 OK
Content-Location: A
Content-Type: text/html
Content-Language: en
GET with conneg on URI T – Server List – 406 Not Acceptable

GET T HTTP/1.1
Accept: application/pdf, text/html;q=0.8
Accept-Language: de, fr;q=0.0, en-US;q=0.0

HTTP/1.1 406 Not Acceptable
TCN: list
Vary: negotiate, accept, accept-language
Alternates: ("A" 0.8 type application/pdf)
{language fr}, {"B" ...}, {"C" ...}
How does Memento do This?

- **Component 1: Navigation towards an archived resource via its original resource, by leveraging content negotiation.**
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$_i$ [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 $t_c \geq t_i$. 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.:
  - HTTP Request:
    o Accept-Language: en-US
    o HTTP Response:
      o Content-Language: en-US

- Inspired by RFC 2295, Memento introduces datetime conneg:
  - HTTP Request:
    o Accept-Datetime: Mon, 12 Oct 2009 14:20:33 GMT
    o HTTP Response:
      o Content-Datetime: Sun, 11 Oct 2009 11:18:05 GMT
DT-conneg: Content Negotiation in the datetime dimension

- This means that somewhere, we will need transparently negotiable resources (cf. slides 38-40) that supports the datetime dimension to get to appropriate Mementos.

- This will be discussed for 2 classes of servers:
  - Web servers without internal archival capabilities;
  - Web servers with internal archival capabilities.
Servers Without Internal Archival Capabilities

- This type includes:
  - Servers that are crawled by a web archive, such as the Internet Archive
  - Servers with an associated transactional archive

- These servers are not aware of the details of Mementos of their resources held by external archives.
- These servers do not have the essential information (URI-Ms, and associated datetimes) to respond to a DT-conneg request.

- But they can be constructive by pointing (HTTP Link) a client to an archive that can respond to the DT-conneg request.
  - Unconditionally do this for resources for which Mementos are conceivably available in the archive.
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http://lanlsource.lanl.gov/

Memento Experiment

Oct 04 2009, 12:00:01 UTC

Oct 10 2009, 12:00:03 UTC

Oct 21 2009, 12:00:01 UTC

http://mementoarchive.lanl.gov/store/ta/20091021
120001/http://lanlsource.lanl.gov/hello
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original resource

Mementos

original server

archival server
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original resource

Mementos

variant resources

original server

archival server

transiently negotiable resource

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

transparently negotiable resource

HTTP Link

G

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

Mementos

variant resources

original server

archival server
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-Mᵢ[URI-R@ₜᵢ] 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.
Servers With Internal Archival Capabilities

• This type includes:
  ○ Content Management Systems
  ○ Version Control Systems
  ○ 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.

• The previous architectural solution is maintained to enforce strict distinction between handling requests for current and past representations.
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Dec 20 2001, 4:51:00 UTC

Dec 31 2004, 20:46:00 UTC

Dec 20 2008, 22:21:00 UTC

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original resource

TimeGate

transarently negotiable resource

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

original server

variant resources

Mementos
A Memento HTTP Navigation involving an Aggregator
A Memento HTTP Navigation involving an Aggregator

Scenario

• www.digitalpreservation.gov points at TimeGate provided by an Aggregator
• URI-R, URI-G, URI-M on different servers
Memento HTTP Flow

**HEAD R, Accept-Datetime**

Link → G

GET G, Accept-Datetime

302 → M, Vary, TCN, Link → R,B,M

GET M, Accept-Datetime

200, Content-Datetime, Link → R,B,M
Memento HTTP Flow: URI-R

HEAD R, Accept-Datetime

HEAD / HTTP/1.1
Host: www.digitalpreservation.gov
Accept-Datetime: Sat, 10 Oct 2009 00:00:00 GMT
Connection: close
Memento HTTP Flow

HEAD R, Accept-Datetime

Link\rightarrow G

GET G, Accept-Datetime

302\rightarrow M, Vary, TCN, Link\rightarrow R,B,M

GET M, Accept-Datetime

200, Content-Datetime, Link\rightarrow R,B,M
HTTP/1.1 200 OK
Date: Thu, 21 Jan 2010 00:02:12 GMT
Server: Apache
Link:
Content-Length: 255
Connection: close
Content-Type: text/html; charset=iso-8859-1
Memento HTTP Flow

HEAD R, Accept-Datetime

Link ➔ G

GET G, Accept-Datetime

302 ➔ M, Vary, TCN, Link ➔ R,B,M

GET M, Accept-Datetime

200, Content-Datetime, Link ➔ R,B,M
Memento HTTP Flow: URI-G

GET G, Accept-Datetime

GET /aggr/timegate/http://www.digitalpreservation.gov/ HTTP/1.1
Host: mementoproxy.lanl.gov
Accept-Datetime: Sat, 10 Oct 2009 00:00:00 GMT
Connection: close
Memento HTTP Flow

HEAD R, Accept-Datetime

Link ➔ G

GET G, Accept-Datetime

302 ➔ M, Vary, TCN, Link ➔ R,B,M

GET M, Accept-Datetime

200, Content-Datetime, Link ➔ R,B,M
HTTP/1.1 302 Found
Date: Thu, 21 Jan 2010 00:06:50 GMT
Server: Apache
TCN: choice
Vary: negotiate, accept-datetime
Link: <http://www.digitalpreservation.gov/>; rel="original",
     <http://wayback.archive-it.org/256/20051108162921/http://www.digitalpreservation.gov/>; rel="first-memento"; datetime="Tue, 08 Nov 2005 00:00:00 GMT",
     <http://wayback.archive-it.org/256/20100120102000/http://www.digitalpreservation.gov/>; rel="last-memento"; datetime="Wed, 20 Jan 2010 10:20:00 GMT"
Content-Length: 0
Connection: close
Memento HTTP Flow

HEAD R, Accept-Datetime

Link ➔ G

GET G, Accept-Datetime

302 ➔ M, Vary, TCN, Link ➔ R, B, M

GET M, Accept-Datetime

200, Content-Datetime, Link ➔ R, B, M
Memento HTTP Flow: URI-M

GET M, Accept-Datetime

GET /1610/20090928171405/http://www.digitalpreservation.gov/ HTTP/1.1
Host: wayback.archive-it.org
Accept-Datetime: Sat, 10 Oct 2009 00:00:00 GMT
Connection: close
Memento HTTP Flow: Success – URI-M

HTTP/1.1 200 OK
Server: Apache-Coyote/1.1
X-Archive-Orig-Accept-Ranges: bytes

Content-Type: text/html; charset=utf-8
Content-Length: 23364
Date: Thu, 21 Jan 2010 00:09:40 GMT
Content-Datetime: Mon, 28 Sep 2009 17:14:05 GMT
Link: <http://www.digitalpreservation.gov/>; rel="original",
    <http://wayback.archive-it.org/256/20051108162921/http://www.digitalpreservation.gov/>; rel="first-memento"; datetime="Tue, 08 Nov 2005 00:00:00 GMT",
    <http://wayback.archive-it.org/256/20100120102000/http://www.digitalpreservation.gov/>; rel="last-memento"; datetime="Wed, 20 Jan 2010 10:20:00 GMT"

Connection: close

Link header values are local to wayback.archive-it.org and different than those provided by URI-G
The Web with Time Dimension added by Memento

Original Resource -> URI-R

URI-R -> URI-G

URI-G -> Memento

HTTP Link original

HTTP Link timegate

HTTP GET Accept-Datetime: \( t_j \)

HTTP GET Accept-Datetime: \( t_j \)

Memento

Original Resource

TimeGate

URI-M1

URI-M1 -> URI-M2

HTTP Link memento

URI-M2
Why Care About The Past?

From an anonymous reviewer (*emphasis* mine):

"Is there any statistics to show that many or a good number of Web users would like to get obsolete data or resources?"
Replaying the Experience…

…can be more compelling than a summary
Voices from the Gulf Coast

August 29, 2005: Hurricane Katrina made landfall on the Gulf Coast, destroying lives, leveling homes and leaving thousands of survivors with the same story: We lost everything. One year later, many still coped with Katrina's devastation. Some had moved forward, but for others recovery was at a standstill. CNN.com visited the region to get their stories.
VS.

(thanks to Michele Weigle for the following Memento selection)
Strengthening Katrina to hammer Gulf Coast

Blamed for at least seven deaths in Florida, powerful Hurricane Katrina is becoming stronger as it churns in the Gulf of Mexico. Forecasts say it’s poised to deal a hammer blow to the Mississippi Gulf Coast and southeast Louisiana as a possible Category 4 storm early next week. Meanwhile, residents of southeast Florida are cleaning up after Katrina cut across the state packing strong winds and dumping heavy rain.

FULL STORY
• Watch: Oil rig evacuates | Homes flooded

MORE NEWS
• 1,000 prisoners released from Iraq prison
• Brothers held again in Natalee Holloway case | Watch
• Vote to save bases in 2 states, lawsuit in third | Watch
• Watch: Anti-Sheehan group takes duel to Texas (2:20)
• Power-packed muscle cars come roaring back
• Oprah ‘furious’ at funeral snub claim
• U.S. soldier killed in Afghan attack
• Bush counsels patience in viewing Iraq war
• Criminal probe into 17 Paris fire deaths | Gallery | Watch

WATCH FREE VIDEO

Mistaken for a terrorist (2:17) | Soundcheck with Faith Hill (2:35)

Now In The News (11:14 a.m. ET): Your quick news update

BUSINESS at CNNMoney
Markets: As of close Aug 26
DOW -53.34 10,397.29
NAS -13.60 2,120.77
S&P -7.29 1,205.10

ON CNN TV
Dead Wrong: Inside an Intelligence Meltdown
How did U.S. intelligence get it so wrong? CNN investigates how faulty intelligence led to the Iraq war.
Katrina drives people away from Gulf Coast

People leaving New Orleans pack highways.

Tourists and New Orleans residents are leaving the city as Hurricane Katrina churns closer to Louisiana and Mississippi. Officials fear New Orleans is vulnerable because it sits an average of 6 feet below sea level. Katrina could be a category 4 when it makes landfall. "This is a very, very dangerous hurricane," says hurricane center Director Max Mayfield.

FULL STORY
• Watch: 'Very concerned' | 'Big Easy' prepares

MORE NEWS
• Northwest strikers stay on picket lines
• California files french fry lawsuit
• Dual protests square off in Crawford | Watch
• CNN/Money: Greenspan: End of home boom inevitable
• Encephalitis outbreak hits children, poor | Watch
• Oprah 'furious' at funeral snub claim
• Watch: Will aging rats lead to younger people?
• Tall, twisted building opens
• 'Milkshake murder' trial nears end
• Dutch investigate producer's 'Big Brother' baby plan

WATCH FREE VIDEO

Browse/Search

Living longer (2:05)
Nail polish car (56)

Now In The News: Your quick news update

FEATURED VIDEO

More Video Picks

BUSINESS at CNNMoney

Markets: As of close Aug 26
DOW -53.34 10,397.29
NAS -13.60 2,120.77

ON CNN TV

Reasonable Doubt: Can crime labs be trusted?
DNA has cleared some innocent people. But forensic
New Orleans orders mandatory evacuation

MORE NEWS
- Committee signs Iraq's draft constitution | Watch
- Suicide bomber injures 21 in Israel | Watch
- California files french fry lawsuit
- Dual protests square off in Crawford | Watch
- Watch: Will aging rats lead to younger people?
- 'Milkshake murder' trial nears end
- Report: Swazi princess whipped for loud music
- USS Monitor's cat mystery
- Rap mogul 'Suge' Knight shot at Miami party

WATCH FREE VIDEO
- Lap danger (2:48)
- Human cannonball crosses border (48)

Now In The News (10:33 a.m. ET): Your quick news update

DEVELOPING STORY
With powerful and strengthening Hurricane Katrina headed straight for his city, the mayor of New Orleans today ordered the mandatory evacuation of residents. The Category 5 storm has maximum sustained winds near 175 mph and has already been blamed for nine deaths in South Florida. Looking ahead, Max Mayfield of the National Hurricane Center said: "It has the potential for a large loss of life."
Killer Katrina heading inland

- Mississippi: Three dead, "unprecedented damage"
- More than 50 rescued from floods in New Orleans
- Katrina downgraded to tropical storm
- Parts of six Louisiana parishes "devastated"
- Oil rig breaks loose, hits Mobile River bridge
- "Life-threatening storm surge flooding" occurring

DEVELOPING STORY

- Watch: Wind flogs Mobile | A beaten 'Big Easy'
- Watch: Katrina's destructive day | Biloxi battered
- Gallery: Photoblog | CNN reporters: In the heart of storm
- Special Report: Tracking Katrina | In depth | Gallery
- Citizen Journalist: Your e-mails | Gallery | Share your story

Residents in New Orleans struggle to keep above the rising flood waters.
54 DEAD IN MISSISSIPPI

Levee breached in New Orleans

- Estimated 50 dead in 1 Mississippi county, officials say
- Levee breach in New Orleans forces hospital evacuation
- 1.3 million without power
- Tens of thousands to be homeless for months
- American Red Cross launching its largest relief operation

FULL STORY

- CNN Access: My apartment complex is totally leveled
- Watch: Rescued from a roof | Water rises to eaves
- Gallery: Photoblog | CNN reporters: In the heart of storm
- Special Report: Tracking Katrina | In depth | Gallery
- Citizen journalist: Your e-mails | Gallery | Share your story

Residents struggle to keep above the rising flood waters.

MORE NEWS

- Huge relief effort under way
- 54 die in Mississippi, 50 in one county | Watch
- Louisiana evacuees told stay away | Watch
- Downtown Mobile under water | Watch
- CNN/Money: Wholesale gas prices soar | Watch
- TIME.com: Is global warming fueling Katrina?
STATES OF DEVASTATION

Death toll rising in Katrina's wake

- Impact: Katrina’s toll leaves Gulf Coast reeling | Watch
- People: Survivor describes harrowing experience | Watch
- Recovery: Aid groups sending rescuers, supplies | Watch
- Assistance: How to help storm victims | Watch

DEVELOPING STORY

- Watch: Screams for help | Day that wouldn’t end
- Watch: Katrina-spawned tornado destroys farm
- Watch: Everything is gone | Rooftop rescue | Katrina’s fury
- Special Report: Tracking Katrina | Gallery | Map
- Assisting victims: Do you want to help?
- Citizen Journalist: Your e-mails | Gallery | Share your story

Floodwaters from Hurricane Katrina cover a portion of New Orleans today.
SLIPPING INTO CHAOS

Unrest grows in New Orleans

- Water still rising in Crescent City, with no way out
- Looting, shootings reported
- New Orleans mayor blasts failure to patch levees
- Louisiana governor declares day of prayer
- Critical patients being airlifted, shelters being evacuated
- Paint marks indicate Mississippi homes with bodies

FULL STORY
- Watch: Chaotic aftermath | Tragedy, devastation
- Watch: The struggle to survive | Nature's fury explained
- Special Report: Trail of destruction | Gallery | Map | Blog
- Citizen journalist: Your e-mails | Gallery | Share your story
- Hotlines: Emergency info | How to help

A shotgun-toting New Orleans police officer has a word with a man on Canal Street.

MORE NEWS
- Mayor blasts failure to patch levee breaches
- Tensions rising in New Orleans
- Relief efforts mobilizing
- Victims left with nothing
- States struggle with destruction
- Alabama power outage statewide
- Mississippi expects heavy death toll

WATCH FREE VIDEO
- Lifted to safety (2:32)
- Hurricane Katrina's ongoing aftermath (4:00)

Now In The News: Your quick news update
HEALTH EMERGENCY

Health fears as bodies lie in water

- Public health emergency declared; cholera, typhoid fears
- Katrina death toll so far estimated at least 120
- New Orleans mayor says toll in his city will be hundreds
- Superdome evacuees moving to Astrodome

FULL STORY
- Watch: Saved by a tree | Dome must be evacuated
- Watch: For Slidell, very bad bump in road
- Special Report: Trail of destruction | Gallery | Levee system
- Citizen Journalist: Your e-mails | Gallery | Share your story
- Hotlines: Where to get and give help

Survivors on an apartment building roof try to get the attention of rescuers.

MORE NEWS
- Public health threat looming | Watch
- Superdome victims moving to Texas | Watch
- CNN reporters: Heartbreak across the coast
- Feds fan out for storm recovery efforts | Watch
- Wife makes desperate trip with husband's body | Watch
- Health risks post-Katrina
- Clinging to a tree (3:25)

WATCH FREE VIDEO

Now In The News (3:31 p.m. ET): Your quick news update

Featured Video
GETTING OUT

Evacuation of survivors begins

- Public health emergency declared; cholera, typhoid fears
- First evacuee buses leave New Orleans
- Bush: "One of the worst national disasters"
- Extra 10,000 National Guard troops called up

FULL STORY

- Watch: Heartbreaking trip home | Searching for bodies
- Watch: How the levees broke | Saved by a tree
- Special Report: Trail of destruction | Gallery | Levee system
- Citizen Journalist: Your e-mails | Gallery | Share your story
- Hotlines: Where to get, give help | Tell people you're safe

Buses leave New Orleans with evacuees who had been holed up in the Superdome.

MORE NEWS

- CNN exclusive: Police unable to aid sick woman
- Babies evacuated from ICU | Watch
- Public health threat looming | Watch
- Superdome evacuees head to Houston | Watch
- Huge sandbags planned for levee leaks |
DESPERATION AND DANGER

Boat rescues suspended

- Boat rescuers asked to stand down due to dangers
- Huge crowd spotted at New Orleans convention center
- Gunfire, looting, small fires disrupt Superdome evacuation
- Citizens holed up in high-rises throng to buses
- Major buildings “pancaking” in Mississippi

DEVELOPING STORY
- Watch: Nobody in control | Fires at Superdome
- Watch: Newborns rescued | Heartbreaking trip home
- Special Report: Trail of destruction | Gallery | Levee system
- Citizen Journalist: Your e-mails | Gallery | Share your story
- Hotlines: Where to get, give help | Tell people you’re safe

Storm victims are stuck without food or water at the New Orleans Convention Center.

MORE NEWS
- Bush tells victims: ‘A lot of help coming’
- CNN/Money: Bush: ‘Zero tolerance’ on gouging
- Town wiped off the map by Katrina
- CNN exclusive: Police unable to aid sick woman
- Spain MP among stranded in New Orleans
- Federal rescue teams arriving

WATCH FREE VIDEO

FEMA suspends rescue operations (2:34)

Now In The News (11:48 a.m. ET): Your quick news update

Anger and outrage (3:38)
AID IN, PEOPLE OUT

Some hope returns to New Orleans

- Food and medicine arrives for desperate survivors
- 40,000 patients airlifted from hospitals
- Bush sees destruction — and meets angry mayor
- But thousands still stranded in homes and centers

DEVELOPING STORY

- Watch: Fires and floods | Aid rolls in
- Watch: Bush: it seems dark right now | The military mission
- Special Report: Hurricane Katrina | Street-by-street
- Citizen Journalist: Your e-mails | Gallery | Share your story
- Hotlines: Where to get, give help | Tell people you’re safe
- CNN TV: The struggle for New Orleans, on CNN

Military personnel distribute food and water Friday at the convention center in New Orleans.
HELCIOPTER HEROES

Breaking News

Rescuers going roof-to-roof

- AP: Army engineers say police shoot dead its contractors
- Helicopters dropping supplies, picking up survivors
- Convention center mostly evacuated
- Mayor: Police, firefighters traumatized

Developing Story

- Watch: Coast Guard rescuers | Some refuse to leave
- Watch: Mississippi wipe out | Mayor: Officers traumatized
- Hotlines: How to get, give help | Tell people you’re safe
- Citizen Journalist: Your e-mails | Gallery | Share your story
- Special Report: Timeline | New Orleans: Block by block
- On CNN TV: Dr. Phil on healing after Katrina, 9 p.m. ET

A U.S. Air Force rescuer is dropped onto a rooftop to help trapped Katrina victims.

More News

- Chief Justice Rehnquist dies at 80 | Watch
- Manning brothers team up for relief | Watch
- New Orleans couple weds in Mississippi shelter
- Mobile hospital stopped by red tape
- Misery has company at Mississippi motels
- Evacuees anguish at leaving pets behind

Watch Free Video

- Misery in Mississippi (2:16)
- Musical tribute to New Orleans (3:08)

Now in The News (5:52 p.m. ET): Your quick news update
Memento wants to make navigating the Web’s Past Easy

http://www.mementoweb.org
http://groups.google.com/group/memento-dev