

The *Joy* of Real-Time Collaboration

Erik Moeller and C. Scott Ananian / Designs by Pau Giner - Wikimania 2014
With thanks to Dario Taraborelli, Ori Livneh, and Erik Zachte

Real-time editing today

Example article: "2014 pro-Russian unrest in Ukraine" on English Wikipedia

- [\(cur | prev\)](#) 21:04, 9 May 2014 RGloucester (talk | contribs | block) . . (153,736 bytes) **(-657)** . . *(No one doubts that. What I doubt is giving it undue weight in this article, as it already mentions it in the body, and directs one to appropriate article. There is no need for an additional section, and the 'notable participants' is meant for people.)* ([undo](#) | [thank](#))
- [\(cur | prev\)](#) 21:01, 9 May 2014 Nug (talk | contribs | block) . . (154,393 bytes) **(+657)** . . *(→Notable participants: This article spans Crimea, Putin confirms Russian soldiers participated)* ([undo](#) | [thank](#))
- [\(cur | prev\)](#) 20:56, 9 May 2014 RGloucester (talk | contribs | block) . . (153,736 bytes) **(-874)** . . *(→Attacks on journalists: "VoR reported that Interfax mentioned that Lifenews reported" - Hearsay to the extreme, and absolutely ridiculous.)* ([undo](#) | [thank](#))
- [\(cur | prev\)](#) 20:53, 9 May 2014 RGloucester (talk | contribs | block) **m** . . (154,610 bytes) **(-1)** . . *(General formatting, date formats per WP:MOSNUM by script)* ([undo](#) | [thank](#))
- [\(cur | prev\)](#) 20:34, 9 May 2014 EkoGraf (talk | contribs | block) . . (154,611 bytes) **(+298)** . . ([undo](#) | [thank](#))
- [\(cur | prev\)](#) 20:32, 9 May 2014 EkoGraf (talk | contribs | block) . . (154,313 bytes) **(+656)** . . *(Please be carefull, you reverted my whole edit)* ([undo](#) | [thank](#))
- [\(cur | prev\)](#) 20:30, 9 May 2014 RGloucester (talk | contribs | block) . . (153,657 bytes) **(+1)** . . *(→Reactions: grammar)* ([undo](#) | [thank](#))
- [\(cur | prev\)](#) 20:29, 9 May 2014 RGloucester (talk | contribs | block) . . (153,656 bytes) **(-629)** . . *(→Reactions: clarify statement)* ([undo](#) | [thank](#))
- [\(cur | prev\)](#) 20:28, 9 May 2014 EkoGraf (talk | contribs | block) . . (154,285 bytes) **(+656)** . . ([undo](#) | [thank](#))
- [\(cur | prev\)](#) 20:23, 9 May 2014 RGloucester (talk | contribs | block) . . (153,629 bytes) **(-6)** . . *(fix spacing)* ([undo](#) | [thank](#))
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Real-time chat today

Excerpt from <https://meta.wikimedia.org/wiki/IRC/Channels>

#wikipedia-af ^{connect}	Afrikaans	Afrikaans.
#wikipedia-als ^{connect}	Alemannisch	Alemannic, may be logged if necessary.
#wikipedia-ar ^{connect}	العربية	Arabic.
#wikipedia-as ^{connect}		
#wikipedia-ay ^{connect}		
#wikipedia-balkan ^{connect}	Balkan	Balkan, publicly logged, UTF-8/ASCII encoding.
#wikipedia-be ^{connect}		
#wikipedia-bn ^{connect}	বাংলা	This is primarily for Wikipedia, but other Bengali projects are also welcome.
#wikipedia-be-tarask ^{connect}	Беларуская (тарашкевіца)	Belarusian (Taraškievica).
#wikipedia-bg ^{connect}	Български	Bulgarian.
#wikipedia-br ^{connect}		
#wikipedia-bs ^{connect}	Bosanski	Bosanski.
#wikipedia-ca ^{connect}	Català	Catalan.
#wikipedia-ca-vandalisme ^{connect}		
#wikipedia-ch ^{connect}		
#wikipedia-ckb ^{connect}		
#cs.wikipedia ^{connect}		
#wikipedia-cs-rc ^{connect}		
#wikipedia-cs-social ^{connect}		
#wikipedia-ce ^{connect}	Нохчийн	Chechen.
#wikipedia-cs ^{connect}	Česky	Czech, public logging prohibited.

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#wikipedia-ca-vandalisme ^{connect}		
#wikipedia-ch ^{connect}		
#wikipedia-ckb ^{connect}		
#cs.wikipedia ^{connect}		
#wikipedia-cs-rc ^{connect}		
#wikipedia-cs-social ^{connect}		
#wikipedia-ce ^{connect}	Нохчийн	Chechen
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Pop quiz time!

Which kinds of articles are most frequently subject to high velocity editing?

- A. Controversial topics
- B. Crime
- C. Deaths
- D. Disasters
- E. Entertainment
- F. Politics/War

E. Entertainment

Top 50 high velocity articles

(English Wikipedia, ranked by frequency of adjacent edits, May 2014)

Entertainment - 32 articles

Movies and TV shows: 13 articles

Sports: 12 articles

Music: 6 articles

Video games: 1 article

Politics/War - 11 articles

Disasters - 4 articles

Controversial topics - 1 article

Crime - 1 article

Deaths - 1 article



WIKIPEDIA
The Free Encyclopedia

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- Current events
- Random article
- Donate to Wikipedia
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- Interactive
- Help
- About Wikipedia
- Community portal
- Recent changes
- Change page

- Tools
- What links here
- Recent changes
- Upload file
- Special pages
- Page information
- Language

Edit conflict: Red Randall Series

Someone else has changed this page since you started editing it, resulting in an **edit conflict**.

- The **upper text area** contains the page text as it **currently exists** (without your changes).
- Your **version** of the page (with your changes) is shown in the **lower text area**.

You will have to **merge** your changes into the existing text in the upper text area to incorporate your edits. Only the text in the **upper text area** will be saved when you press "Save page"; all other changes in the **lower text area** will be lost.

Please do not just copy the text from the lower text area into the upper, unless you're sure that you want to undo all other changes made while you were editing this page. Rather, please try to compare the two versions and combine them into one text that preserves both your edits and any improvements made by others.

An easy way to resolve an edit conflict without losing your work is to open another tab in your browser, and edit the page in that tab copying your changes from the section at the bottom of the page.

Content that violates any copyrights will be deleted. Encyclopedic content must be verifiable. Work submitted to Wikipedia can be edited, used, and redistributed—by anyone—subject to certain terms and conditions.

B / ⌂ ≡ ⌕ ⌂ → Advanced → Special characters → Help → Go

The ""Red Randall series"" was a 1940s, boys war adventure series by [[R. Sidney Bowen]]. Like the [[Dave Dawson War Adventure Series]] the series pertained to [[World War II]] specifically to the [[Pacific War|Pacific Theatre]] of the war. The main character, Red Randall serves throughout the book series as a military aviator. The books contain frequent deviation from history, such as a [[Fifth Column]] Japanese base on the [[Hawaii Islands]], during the air raid on [[Pearl Harbor]].

```

==Red Randall Series==
{| border="1" | cellpadding="2" | class="wikitable"
|width="50%"|year
|width="25%"|title
|}

1944 || Red Randall at Pearl Harbor
|}
1944 || Red Randall on Active Duty
|}
1944 || Red Randall over Tokyo
|}
1944 || Red Randall at Midway
|}
1944 || Red Randall on New Guinea
|}
1945 || Red Randall in the Aleutians
|}
1945 || Red Randall in Burma
|}
1946 || Red Randall's One-Man War
|}

```

Edt summary (briefly describe the changes you have made)

This is a **minor edit** | Watch this page

By clicking the "Save page" button, you agree to the Terms of Use and you irrevocably agree to release your contribution under the CC BY-SA 3.0 License and the GFDL, with the understanding that a hypertext or URL is sufficient for CC BY-SA 3.0 attribution.

Save page | Show preview | Show changes | Cancel

- Pages transcluded onto the current version of this page:
 - Template:Abbox (edit) (template protected)
 - Template:Child-novel-stub (edit) (semi-protected)
 - Template:Navbar (edit) (template protected)
 - Template:Transclude (edit) (protected)
 - Template:War-novel-stub (edit)
- This page is a member of 1 hidden category:

Differences

Your text	Stored revision
<p>Line 1:</p> <pre> The ""Red Randall series"" was a 1940s, boys war adventure series by [[R. Sidney Bowen]]. Like the [[Dave Dawson War Adventure Series]] the series pertained to [[World War II]] specifically to the [[Pacific War Pacific Theatre]] of the war. The main character, Red Randall serves throughout the book series as a military aviator. The books contain frequent deviation from history, such as a [[Fifth Column]] Japanese base on the [[Hawaii Islands]], during the air raid on [[Pearl Harbor]]. - - - - ==Red Randall Series== } border="1" cellpadding="2" class="prettytable" width="50%" year width="25%" title } </pre>	<p>Line 1:</p> <pre> The ""Red Randall series"" was a 1940s, boys war adventure series by [[R. Sidney Bowen]]. Like the [[Dave Dawson War Adventure Series]] the series pertained to [[World War II]] specifically to the [[Pacific War Pacific Theatre]] of the war. The main character, Red Randall serves throughout the book series as a military aviator. The books contain frequent deviation from history, such as a [[Fifth Column]] Japanese base on the [[Hawaii Islands]], during the air raid on [[Pearl Harbor]]. - - - - - - - - - - ==Red Randall Series== } border="1" cellpadding="2" class="wikitable" width="50%" year width="25%" title } </pre>

Your text

```

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-
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|}
1944 || Red Randall on New Guinea
|}
1945 || Red Randall in the Aleutians
|}
1945 || Red Randall in Burma
|}

```



Edit conflicts

English Wikipedia, July 2014

- >120,000 edit conflicts
- 23,000 registered users encountered a conflict
- Top conflicting articles:
 - Malaysia Airlines Flight 17 - 289 conflicts
 - Twitch (website) - 207 conflicts
 - Operation Protective Edge - 102 conflicts
 - Germany national football team - 72 conflicts
 - FIFA World Cup records - 71 conflicts



100%

Normal text

Arial

11

B*I*U**A**

↑ ↓

More



Wikimania real-time collaboration session

Structure

Wikipedia is already a real-time collaboration tool

Possible data to get

 Edit conflict instrumentation would be useful to show hot spots

 Near-collaborative edits. Histogram? # articles/day getting >X edits?

 IRC usage

How we currently collaborate: etherpads, talk pages, irc channels, etc

How can we reduce friction of this process?

But: Maintaining focus

(possible UX exploration) "Find collaborators"

 Directory

 Advertising via Flow boards

 Metadata about sessions

 "We're collaborating on the military history topic of the day"

 Issues to work on

 Mentorship ("Teahouse")

Real-time notifications

Focus / collaboration mode

Edit conflict/merge UI

(possible UX exploration)

 Chat: On-the-record vs. off-the-record



Erik Moeller

2:24 AM Today

Resolve



Although not a very good one!

N.Agas starts a new article and asks other members of the Astronomy WikiProject to join editing together.



WikiProject

Astronomy

Welcome to the astronomy WikiProject! If you enjoy gazing at the night sky, watching the Moon, stars and planets, or reading about the latest astronomical discoveries, then this is the project for you.

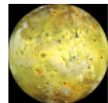
+ New activity

Activity

New articles

Tools

Today



Io (Moon)

Galilean moon of Jupiter

5 editors woking on it

Join the session

12 March



Curiosity → Curiosity (Rover)

Car-sized robotic rover exploring Gale Crater on Mars.

Redirect

Discussion

15 March



Pillars of Creation

astrophotograph

Proposed deletion

Discussion

120 Members

N.Agas

2743 Wikipedia

2 min. ago



Wayne Milk

Callisto (moon)

3 hours ago



Hal Nine K

Callisto (moon)

5 days ago



Mentoring

Carl

Io (moon)

2 min. ago



Anna Wong

Io (moon)

4 days. ago



Jules-Tr

Curiosity (rover)

15 days ago



N.Agas starts a new article and asks other members of the Astronomy WikiProject to join editing together.

WikiProject Astronomy

Welcome to the astronomy WikiProject! If you enjoy gazing at the night sky, watching the Moon, stars and planets, or reading about the latest astronomical discoveries, then this is the project for you.

+ New activity

Topic 274301 Wikipedia Tools

Work on Let's expand this article

Invite Astronomy YuriGgr

[Start editing session](#) [Join the session](#)

12 March [Curiosity](#) → [Curiosity \(Rover\)](#)
Car-sized robotic rover exploring Gale Crater on Mars.
[Redirect](#) [Discussion](#)

15 March [Pillars of Creation](#)
astrophotograph
[Proposed deletion](#) [Discussion](#)

120 Members

N.Agas 2743 Wikipedia 2 min. ago	
Wayne Milk Callisto (moon) 3 hours ago	
Hal Nine K Callisto (moon) 5 days ago	

▼

Mentoring

Carl lo (moon) 2 min. ago	
Anna Wong lo (moon) 4 days. ago	
Jules-Tr Curiosity (rover) 15 days ago	

Jane joins the session to edit “274301 Wikipedia” (asteroid) in real-time mode

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+ New activity

Activity

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Today

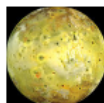


274301 Wikipedia

Main belt asteroid · Let's expand this article

New edit session

Join the session



Io (Moon)

Galilean moon of Jupiter

5 editors woking on it

Join the session

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Curiosity → Curiosity (Rover)

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Anna Wong

Io (moon)

4 days. ago



Jules-Tr

Curiosity (rover)

15 days ago












Jane joins the session to edit “274301 Wikipedia” (asteroid) in real-time mode

The screenshot shows a web browser interface for editing a Wikipedia article. At the top, a green header bar contains the text "One new edit by WayneMilk" on the left, "View recent edits" in the center, and "Pause live updates" on the right. Below the header, the article title "274301 Wikipedia" is displayed in a large, bold font. Underneath the title, a paragraph of text provides information about the asteroid: "274301 Wikipedia (provisional designations: 2008 QH₂₄, 2007 FK₃₄, 1997 RO₄) is a main belt asteroid. It was discovered by the Andrushivka Astronomical Observatory in August 2008. The asteroid was named after the online encyclopedia Wikipedia in January 2013." Below the text, a section header "D" is visible. The top of the browser window shows a toolbar with icons for undo, bold, italic, underline, list, link, and image. On the right side of the page, there are three vertical icons: a person icon, a speech bubble icon, and a clock icon.

Other users add content to the article at the same time. Jane wants to find out who they are ..

The screenshot shows the top portion of a Wikipedia article in edit mode. At the top, there is a navigation bar with a close button (X), the text 'Editing 274301 Wikipedia', and various editing tools (bold, italic, underline, list, undo, redo, link, image). Below this is a green status bar indicating 'One new edit by WayneMilk' and buttons for 'View recent edits' and 'Pause live updates'. The main content area has a title '274301 Wikipedia' followed by a paragraph: '274301 Wikipedia (provisional designations: 2008 QH₂₄, 2007 FK₃₄, 1997 RO₄) is a main belt asteroid. It was discovered by the Andrushivka Astronomical Observatory in August 2008. The asteroid was named after the online encyclopedia Wikipedia in January 2013.' Below the paragraph is a section header 'Discovery' with a sub-paragraph: 'The asteroid was discovered by astronomers from the Andrushivka Astronomical Observatory (A50) in Ukraine. It was also observed on the next night and it received provisional designation 2008 QH24'. Two grey callout boxes are present: one pointing to '2008 QH24' containing the name 'Carl', and another pointing to 'received provisional designation 2008 QH24' containing the name 'Jules-Tr'. On the right side, there are icons for user profile, chat, and a clock.

Jane can view who is participating in the article...


 Editing 274301 Wikipedia        






274301 Wikipedia


274301 Wikipedia (provisional designations: **2008 QH₂₄**, **2007 FK₃₄**, **1997 RO₄**) is a [main belt asteroid](#). It was discovered by the [Andrushivka Astronomical Observatory](#) in August 2008. The asteroid was named after the online encyclopedia [Wikipedia](#) in January 2013.


Discovery

The asteroid was discovered by astronomers from the Andrushivka Astronomical Observatory (A50) in Ukraine. It was also observed on the next night and it received provisional designation 2008 QH24.

Last edited 2 days ago by N.Agas 

 12 Editors 
N.Agas Astronomy 21 edits 
Wayne Milk Spaceflight Blades ... 15 edits 
Hal Nine K Spaceflight 15 edits 



 Invite collaborators

Quick conversation

...and what are they working on.

274301 Wikipedia

274301 Wikipedia (provisional designations: **2008 QH₂₄**, **2007 FK₃₄**, **1997 RO₄**) is a [main belt asteroid](#). It was discovered by the [Andrushivka Astronomical Observatory](#) in August 2008. The asteroid was named after the online encyclopedia [Wikipedia](#) in January 2013.

Discovery

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Last edited 2 days ago by N.Agas



Discussion

A reference is missing

The NASA references don't work for me, and I cannot find a reference for...

JohnS

8 6

Redirects

"Wikipedia Asteroid" and "Asteroid Wikipedia" should redirect to this...

CosminAunt

8 6



+ New topic

Quick conversation

With the live history view, Jane can see changes as they happen, and navigate a timeline of changes.

Curiosity (rover)

Curiosity is a car-sized [robotic rover](#) exploring [Gale Crater](#) on [Mars](#) as part of [NASA's Mars Science Laboratory](#) mission (MSL).^[9]

Curiosity was launched from [Cape Canaveral](#) on November 26, 2011, at 10:02 EST aboard the MSL spacecraft and successfully landed on [Aeolis Palus](#) in Gale Crater on Mars on August 6, 2012, 05:17 UTC.^{[1][11]} The [Bradbury Landing](#) site^[8] was less than 2.4 km (1.5 mi) from the center of the rover's touchdown target after a 563,000,000 km (350,000,000 mi) journey.^[12]

On June 24, 2014, Curiosity completed a [Martian year](#)—687 Earth days—after finding that Mars once had [environmental conditions favorable for microbial life](#).^[16]

Goals and objectives

As established by the [Mars Exploration Program](#), the main scientific goals of the MSL mission are to [find martians](#) [help determine whether Mars could ever have supported life](#), as well as determining the [role of water](#), and to study the [climate](#) ^[13]^[14] and [geology of Mars](#).^{[13][14]} The mission will also help prepare for [human](#) ^[14] exploration.

Last edited 2 days ago by N.Agas

History

1m	Current new news	6 Astronomy	-5 +20
2h	Details on the name	Cronopio	+22
3h	Discovery info	Wayne Milk	-8 +20
4h	Correct style	4 Astronomy	-9 +3
6h	More details	4 Astronomy	-2 +5

Current new news

6 editors [view conversation](#)

N.Agas	
Wayne Milk	
Hal Nine K	
View this version	Revert

Quick conversation

1

Jane can focus on a given paragraph to view authorship...

Curiosity (rover)

Curiosity is a car-sized [robotic rover](#) exploring [Gale Crater](#) on [Mars](#) as part of [NASA's Mars Science Laboratory mission](#) (MSL).^[9]

Curiosity was launched from [Cape Canaveral](#) on November 26, 2011, at 10:02 EST aboard the MSL spacecraft and successfully landed on [Aeolis Palus](#) in Gale Crater on Mars on August 6, 2012, 05:17 UTC.^{[11][1]} The [Bradbury Landing site](#)^[8] was less than 2.4 km (1.5 mi) from the center of the rover's touchdown target after a 563,000,000 km (350,000,000 mi) journey.^[12]

On June 24, 2014, Curiosity completed a [Martian year](#)—687 Earth days—after finding that Mars once had [environmental conditions favorable for microbial life](#).^[6]

Goals and objectives

As established by the [Mars Exploration Program](#), the main scientific goals of the MSL mission are to [find martians help determine whether Mars could ever have supported life](#), as well as determining the [role of water](#), and to study the [climate](#)^{[13][14]} and [geology of Mars](#).^{[13][14]} The mission will also help prepare for [human](#)^[14] exploration.^[14]

Last edited 2 days ago by N.Agas

History

1m	Current new news	6 Astronomy	-5 +20
2h	Details on the name	Cronopio	+22
3h	Discovery info	Wayne Milk	-8 +20
4h	Correct style	4 Astronomy	-9 +3
6h	More details	4 Astronomy	-2 +5

Current new news

6 editors [view conversation](#)

N.Agas	
Wayne Milk	
Hal Nine K	
View this version	Revert

Quick conversation

1

..or on given authors to view how much they contributed.

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Key challenges

- One version - multiple authors
- One “version”?
- Real-time vandalism
- Co-existence of real-time and non-real-time
 - Focused writing
 - Unsupported browsers
 - Social reasons
- Chat misuse
- Wikitext itself

Key applications

- Current events
- Conflict resolution
- Mentoring
- Targeted collaborations
- ... and some we can't imagine

[Browse](#)[Go Turbo](#)[Log In](#)[Sign Up](#)

WGLNA
playing World of Tanks

WGLNA Season 4

Watch the top North American teams from World of Tanks go head to head as they fight for their share of a \$100,000 prize.

[Click here to watch and chat!](#)



Real-time Collaborative Editing with TogetherJS

C. Scott Ananian <cananian@wikimedia.org>
[[User:cscott]]

***Edit conflict! Someone else
has changed this page since
you started editing it.***

Demo.

What the heck is this?

<https://www.mediawiki.org/wiki/Extension:TogetherJS>^[*]

...which is based on *TogetherJS* from Mozilla labs:

<https://togetherjs.com/>

You can install TogetherJS on an arbitrary webpage. The TogetherJS *extension* includes additional code to integrate **TogetherJS**, **Visual Editor**, and the **MediaWiki account system**.

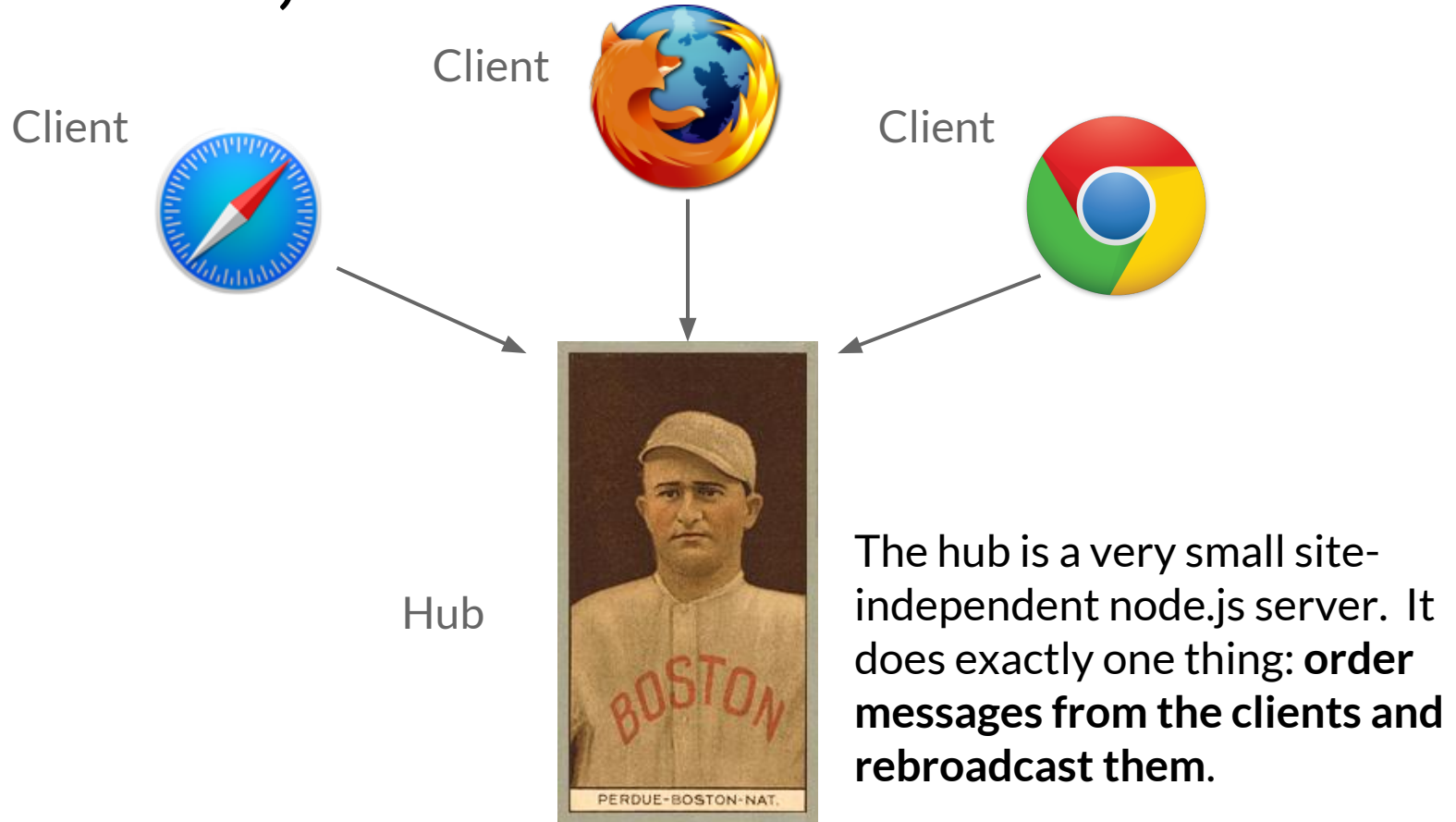
How does it work?

How does it work?

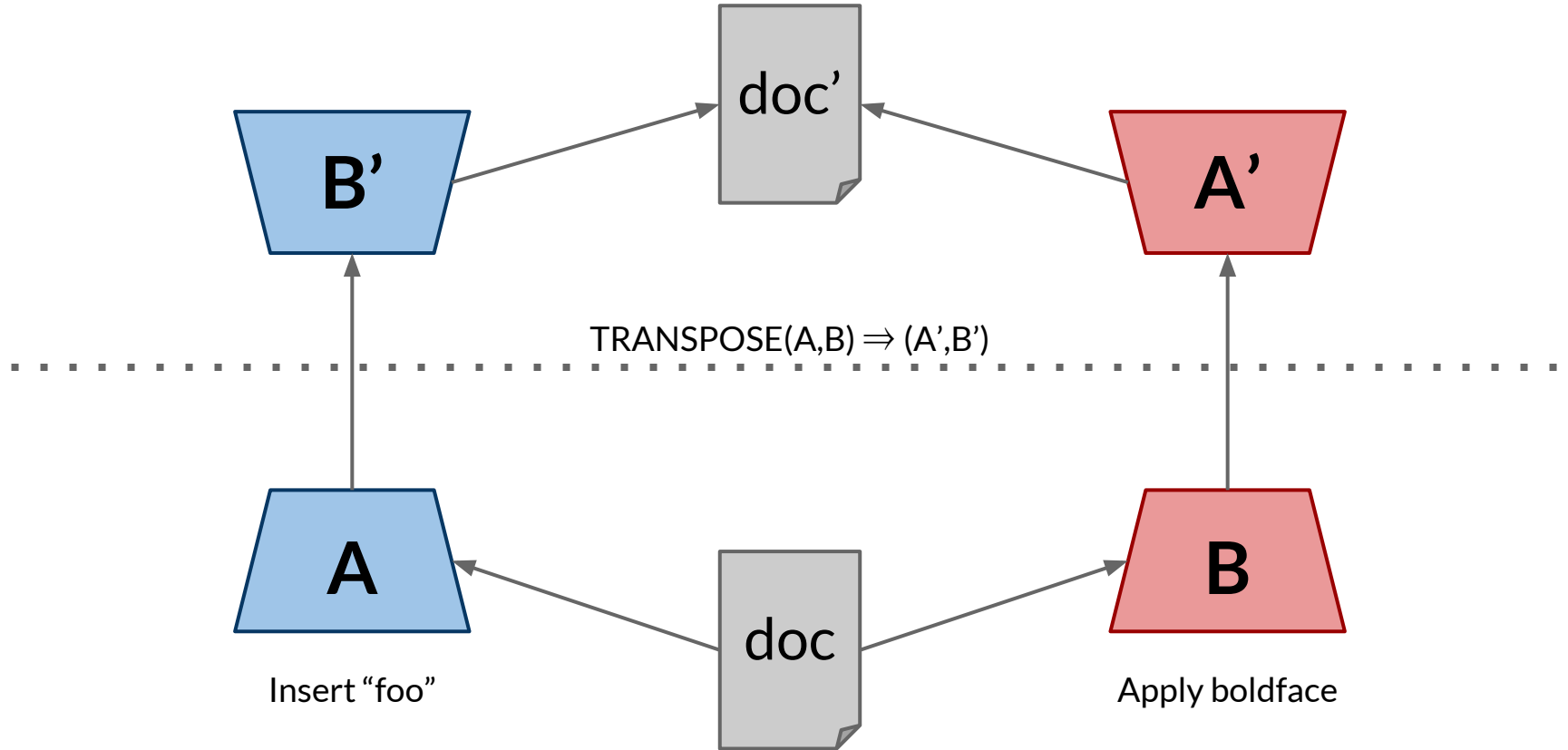
magic



Fat client, thin hub



Operational Transformation (OT)



Hub is responsible for ordering

Everyone sees the same ordered stream of edits:

$A_1 B_1 B_2 C_3 D_4 A_3 A_5 \dots$

Subscript indicates the version of the document which the edit applies to.^[*]

Hub is responsible for ordering

Everyone sees the same ordered stream of edits:

A_1 ~~B_1~~ B_2 C_3 D_4 ~~X_3~~ A_5 ...

Subscript indicates the version of the document which the edit applies to.^[*]

Everyone can see which of these are **invalid**.

When one of your edits is invalid, use the transpose algorithm to update it, and resend.

Transactions for Wikitext edits

1. Insert a string of characters
2. Delete a string of characters
3. Replace a string of characters with a different one.

Transactions for Wikitext edits

- ~~1. Insert a string of characters~~
- ~~2. Delete a string of characters~~
3. Replace a string of characters with a different one.

(really only one type)

Transactions for Visual Editor

Alternating metadata and data:

$m_{0,0}$ $m_{0,1}$ **d_0** $m_{1,0}$ **d_1** **d_2** $m_{3,0}$ $m_{3,1}$ **d_3** $m_{4,0}$

HTML matching this sequence of metadata and data:

```
<!-- comment! -->
```

```
<meta ... />
```

```
<p><!-- sigh -->ab<!--yes--><!--no--></p>
```

```
<!-- eof -->
```

Transactions for Visual Editor

1. Replace elements from the linear model
 - Either squashing metadata or deleting it
2. Replace metadata from the linear model
3. Insert (a portion of a) document
4. Set/clear attributes on an element
 - For example, list style from 'bullet' to 'number'
5. Set/clear annotations on a range of elements
 - For example, "bold" or "italic"

OK, just make it work!

<https://www.mediawiki.org/wiki/Extension:TogetherJS>

...but at the moment requires a patched copy of Visual Editor.

OK, just make it work!

<https://www.mediawiki.org/wiki/Extension:TogetherJS>

...but at the moment requires a patched copy of Visual Editor.
...and it's not actually deployed on Wikipedia.

OK, just make it work!

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...but at the moment requires a patched copy of Visual Editor.
...and it's not actually deployed on Wikipedia.

Alternatively, add:

```
importScript( 'User:cscott/TogetherJS-demo.js' );
```

to [\[\[Special:MyPage/common.js\]\]](#) on your favorite wiki (and have your friends do the same).

Some open questions (and unimplemented features)

- How do we find other editors?
- Do we need “user groups”?
- How to record/display who wrote what in a collaborative session?
- When is a collaborative edit “done”?

Social impact

Teahouse / new user walkthroughs

Do we need friends lists? “Circles”?

(Do we become Facebook?)

Making visible the community behind the wiki.

(Are we a social forum, or a sober & canonical reference?)

Discuss!

C. Scott Ananian
cananian@wikipedia.org
[[User:cscott]]