



Google™ Google Wave

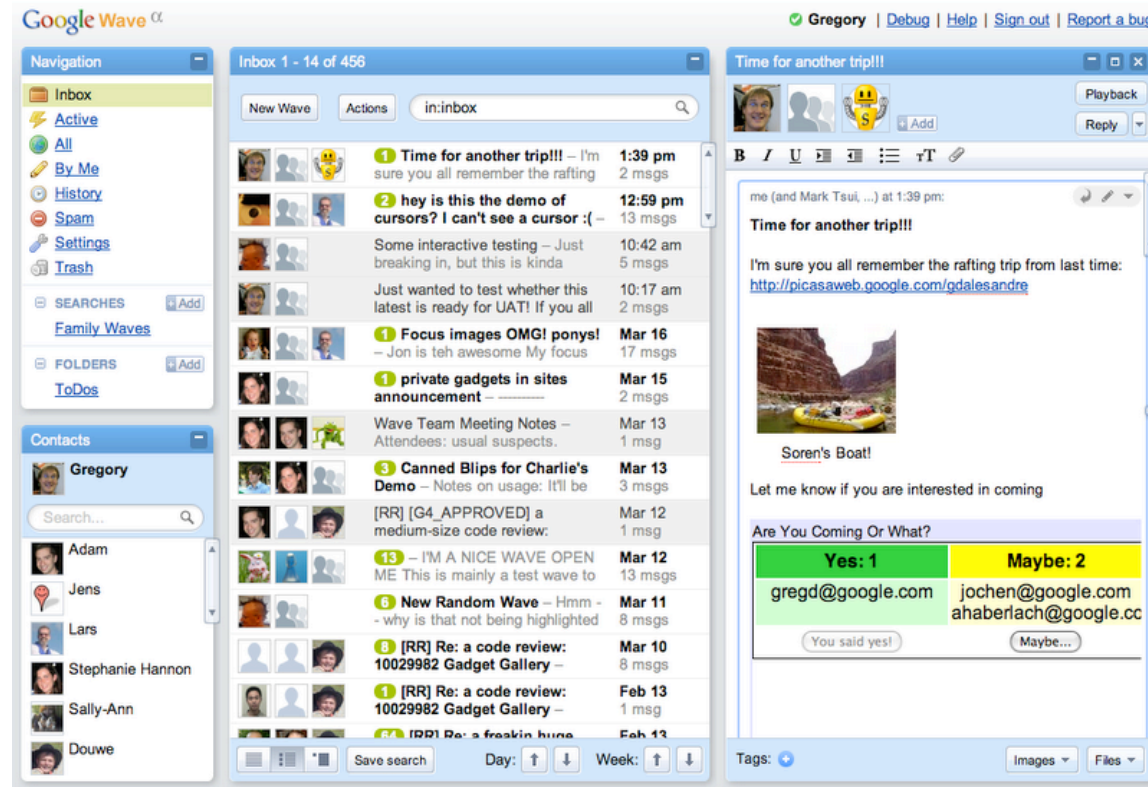
Joe Gregorio
Developer Advocate

Overview of Google Wave

Google Wave Client

search

authentication



*abuse
detection*

*saved
searches*

folders

contacts

presence

*access
control*

playback

waves

attachments

gadgets

Product vs Technology

Google Wave (product)

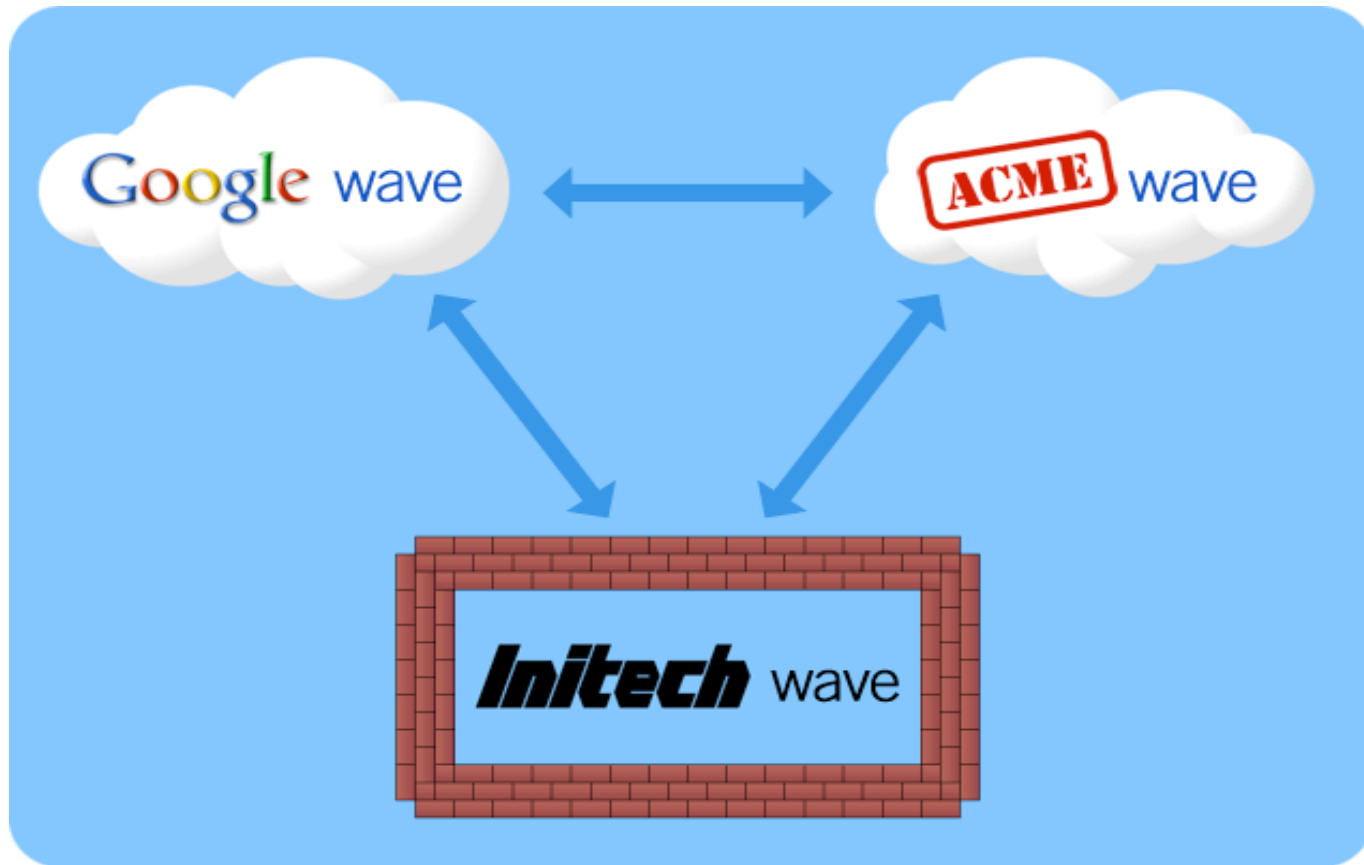
vs

Wave (technology)

wave is to Google Wave as email is to Gmail

Federation

What is Federation?



What is Federation?

Open

Iterating

<http://waveprotocol.org/>

Why Federation?

Avoid Fragmentation

Encourage Adoption

- Open APIs and Standard Protocols
- User Choice

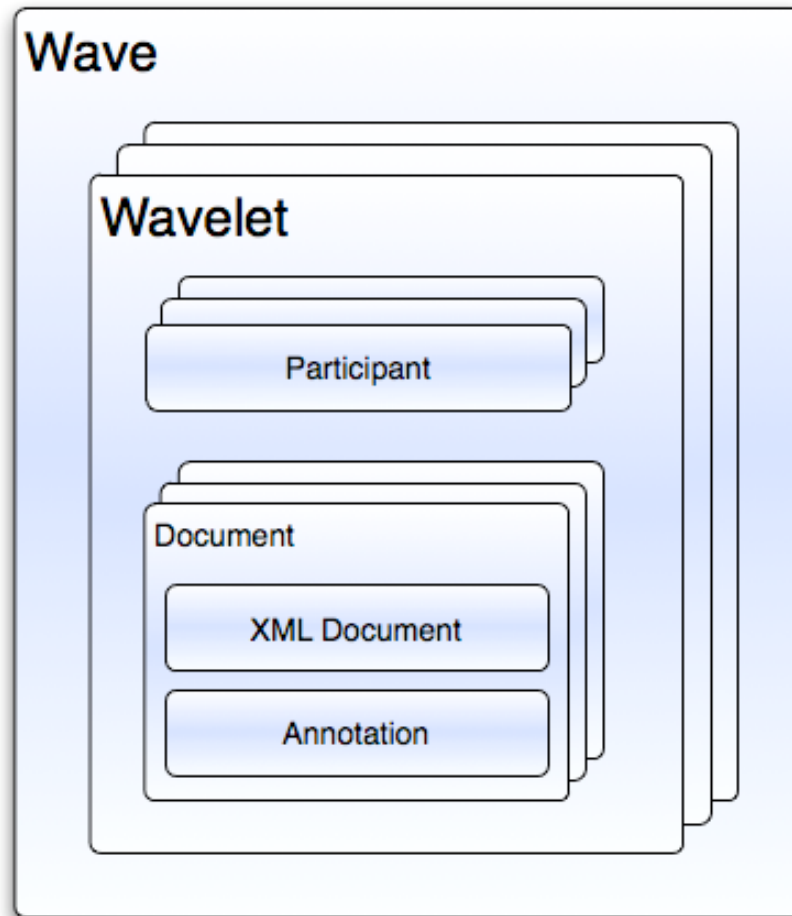
Novell Pulse

Coming in mid 2010, Novell Pulse will first be delivered as a service and then later available for on-premise deployment. It will also work seamlessly with Google Wave so you and anyone you want to work with can have your choice and get down to business.

<http://www.novell.com/products/pulse/>

Technical Background

Wave Data Model



Documents

<body>₀
 <line t='h3'>₁</line>₂H₃e₄l₅l₆o₇!₈
</body>₉

Annotations

```
<body>0  
  <line t='h3'>1</line>2H3e4l5l6o7!8  
</body>9
```

style/fontSize=bold [3,7]

Wave Data Model

Wavelet

- unit of concurrency
- unit of federation

Federation: Sharing Wavelets

Wave Servers

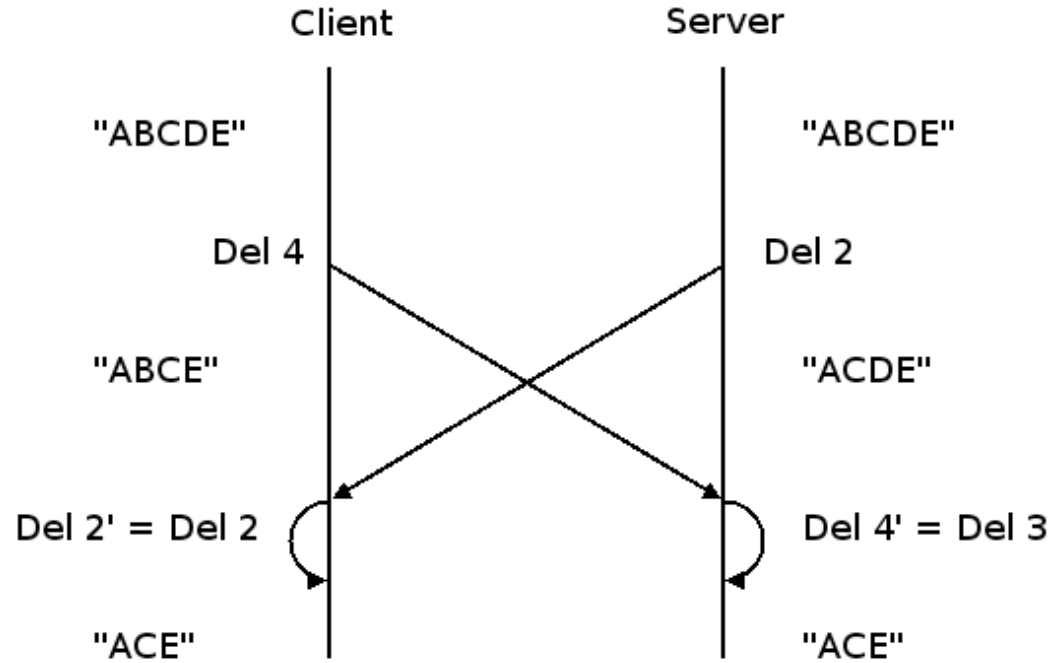
- Run OT
- Share updates to wavelets

Wavelet id determines owner

- *domain: "initech-corp.com"*
- *id: "conv+3sG7"*

Operational Transforms

Operational Transformation



Operational Transformation

Changes to a shared object is an **operation**

- o e.g. insert character "a" at position x

As long as there is a function **transform()** with the following behavior, it is always possible to have all the clients come to an convergent state.

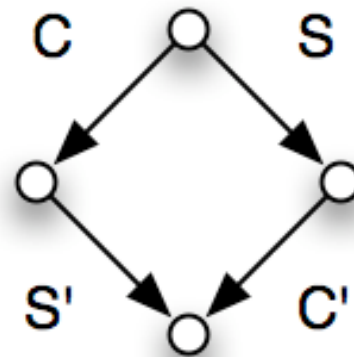
- o S = Server Operation
- o C = Client Operation
- o S' = Transformed Server Operation
- o C' = Transformed Client Operation

$(S', C') = \text{transform}(S, C)$

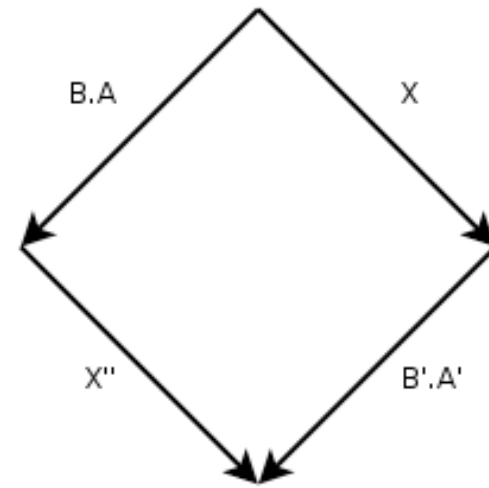
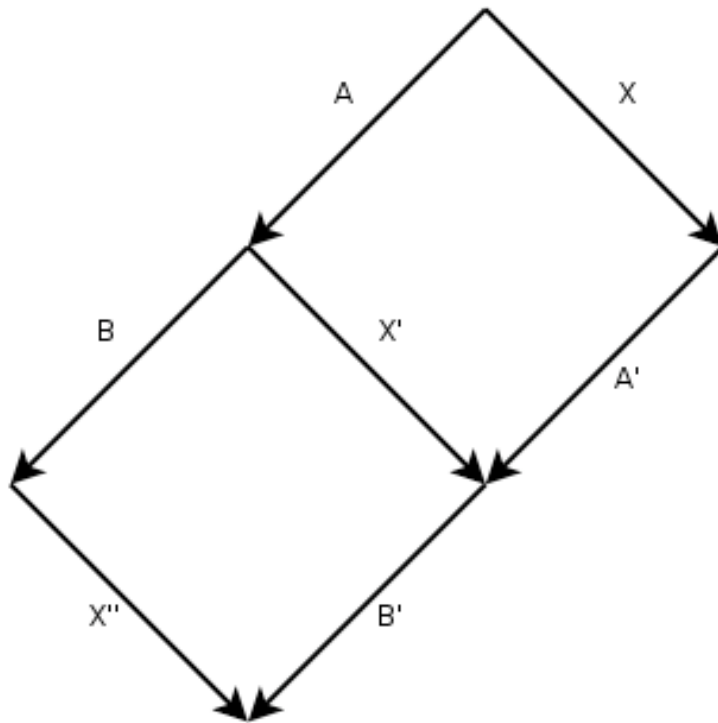
where

$$C' \cdot S = S' \cdot C$$

Client and server must have
the same transform() function

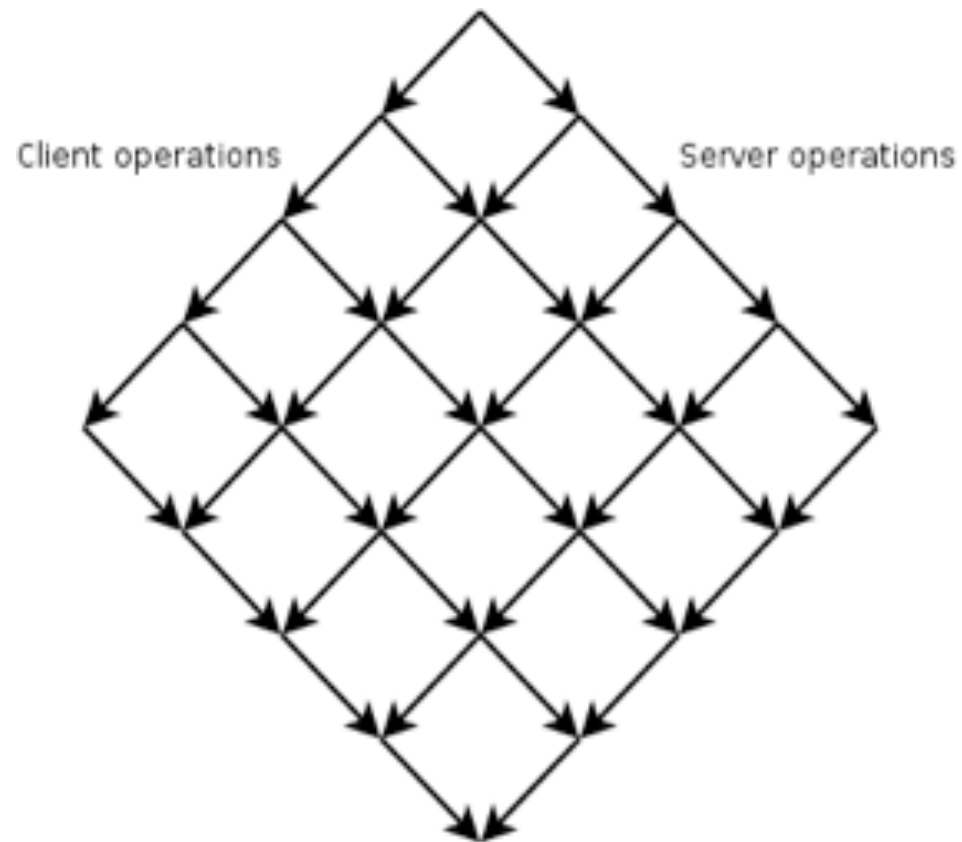


Operations Compose



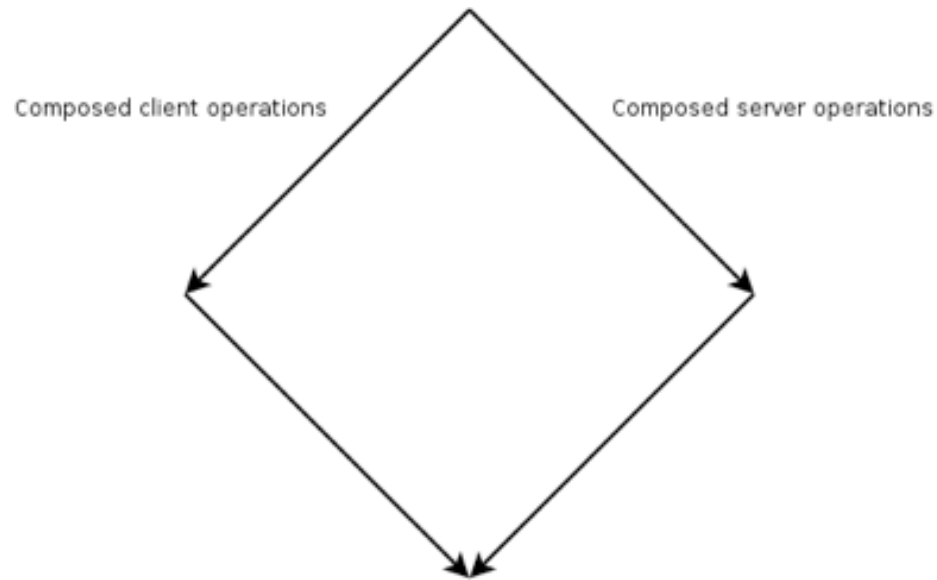
Efficiency

Requires nm transformations, where n is the number of client operations and m is the number of server operations.



First Compose, Then Transform

We can design composition so that transformation running time is $O(n \log n + m \log m)$



Document Interface

A streaming interface.

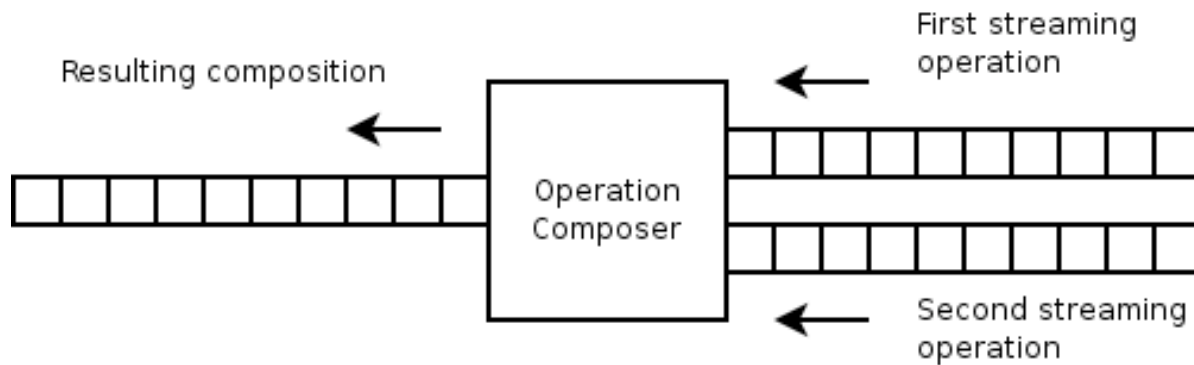
Similar to an XMLStreamWriter or a SAX handler.

An example operation could perform the following sequence:

Skip 8	ElementStart tagName: "li"	Insert "hello"	ElementEnd	Skip 8	Delete 3
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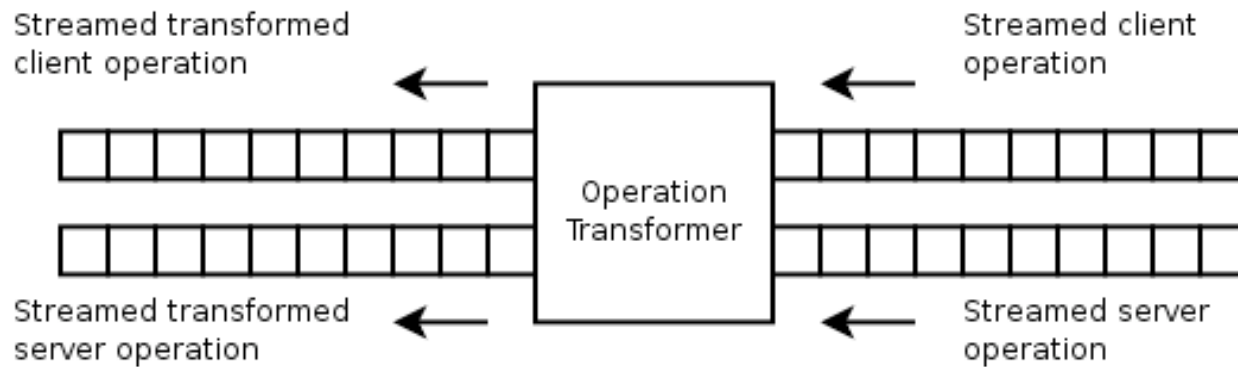
“Zipping”

The operation composer works by "zipping" two streaming operations into a single streaming operation.



“Zipping”

The operation transformer works by "zipping" two streaming operations into two streaming operations.



Triggering Federation

AddParticipant Operation

- david@googlewave.com
- hannon@acmewave.com

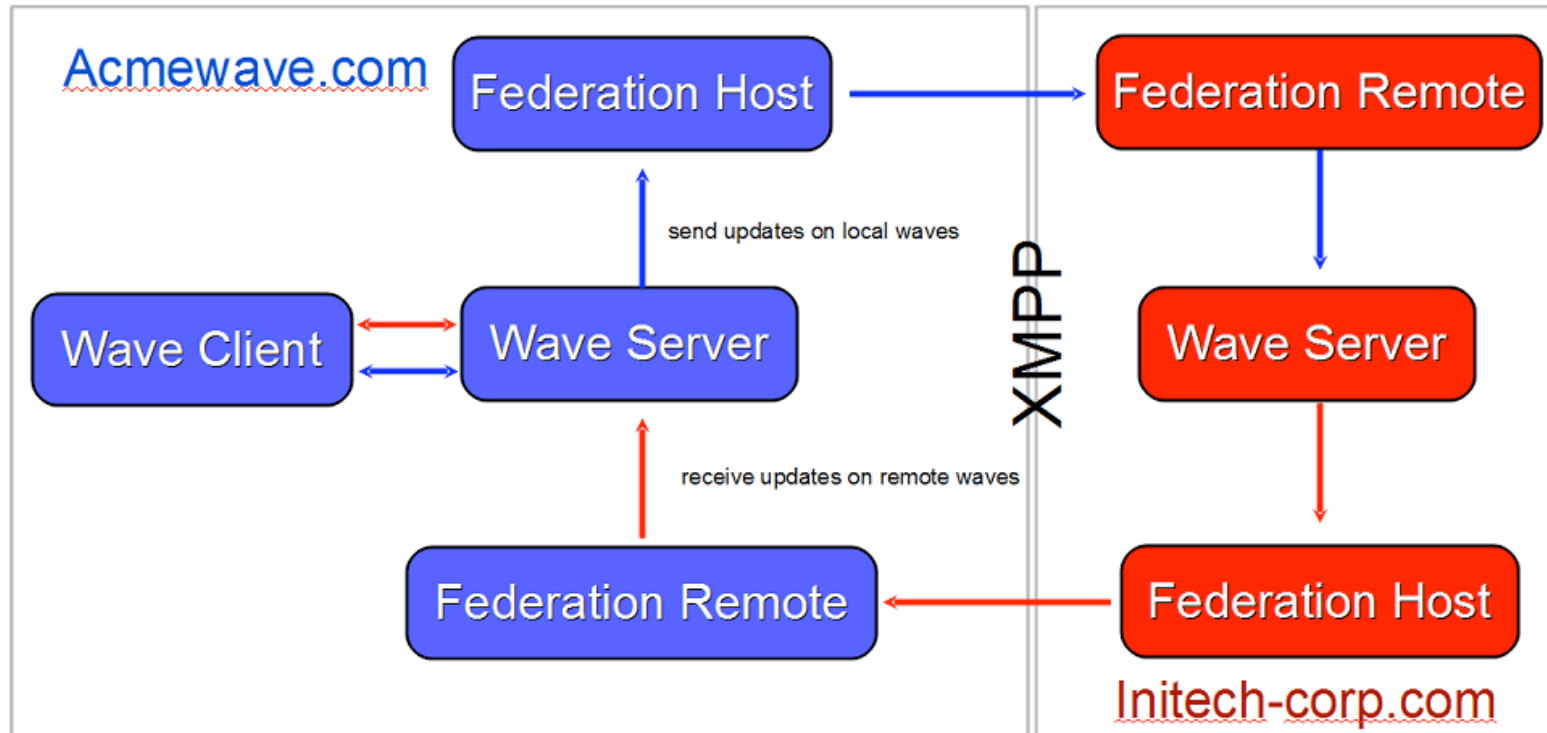
A participant's domain determines where to send ops

Example – Initial Synchronization

bob@acmewave.com adds milton@initech-corp.com

- Bob's client sends AddParticipant("milton@initech-corp.com")
- acmewave.com looks up initech-corp.com's waveserver
- acmewave.com pushes the AddParticipant operation
- initech-corp.com requests the wavelet history

Federation Delta Flow



Data stays on your network

- On-premise solution
- If you don't add anyone from the outside the data stays in your network
- Scenario: Chat between colleagues in a company

Progress to date

Published draft specifications

- Google Wave Federation Protocol
- Google Wave Conversation Model

Progress to date

Open source

- <http://code.google.com/p/wave-protocol/>
- ~40K lines of code, Java, Apache 2.0

Two Components:

- *Wave Model + Operational Transformation*
- *FedOne: Basic prototype client/server and early crypto library*

FedOne

Executable spec for the wire protocol

Not the beginning of a reference impl

FedOne

```
0) (w+AFP1tnw4B) You mean except for PEBKAC?Federation with InitechThis works g
1) (w+WwFWLd14A) blahblahtesttestOPS lol
2) (w+cnt_fvhdqK) lies!!!!!!!La la la la .shut up faceyshoosh robotwhatZOMB

Version 84:b217fa7931f04fe64e76282cf44044eb9732bec6
With sam@wavesandbox.com, sam@initech-corp.com
-----

Blip: b+AFP1tnw4C

Federation with Initech
This works great!

Blip: b+UT87hd81A

Even with indented replies.

Blip: b+epq18q

A local reply

Blip: b+UT87hd81E

Not really local - more like remote!

Blip: b+YGvApw

What do you think of this Federation?

Blip: b+UT87hd81B

It's not so bad! You're all signed and everything - I can believe* what you say.

Blip: b+ebh167

You mean except for PEBKAC?

Blip: b+UT87hd81C

Yep!
```


Work in progress

Opening up a federation port on WaveSandbox.com

- Still highly experimental

Updating the FedOne client/server

- Client does a better job displaying OT
- Server understands the new conversation manifest

Published a Google Wave Contributors Licensing Agreement

Demo

Going Forward

Iterating towards stable specifications

Gain experience running an open federation port

Open a federation port on wave.google.com

Open source the lion's share of Google's client & server

Develop a production quality reference implementation

Participate

Google can't do this alone!

We'd like to work with you.

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

<http://groups.google.com/group/wave-protocol/>

Questions?

Agents and Robots

