Hyper Source

Bridging the Gap between Web Browser and IDE

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Like Two Ships in the Night...

Developers spend significant time outside their code editor and inside their Web browser.

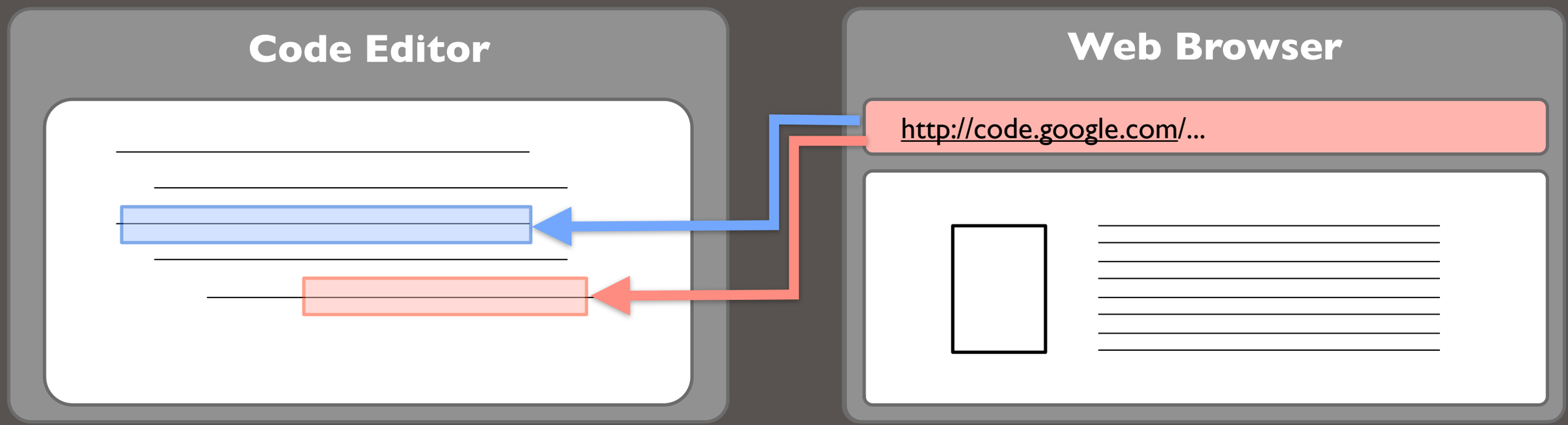
19% of programming time is spent on the web (Brandt, CHI'10)

Editors and browsers remain largely unaware of each other.

Bridging the Gap

Research idea: Track web history directly inside source documents.

Hypothesis: Saving web pages visited while editing code can **(1)** help developers re-retrieve relevant pages and **(2)** facilitate code understanding.

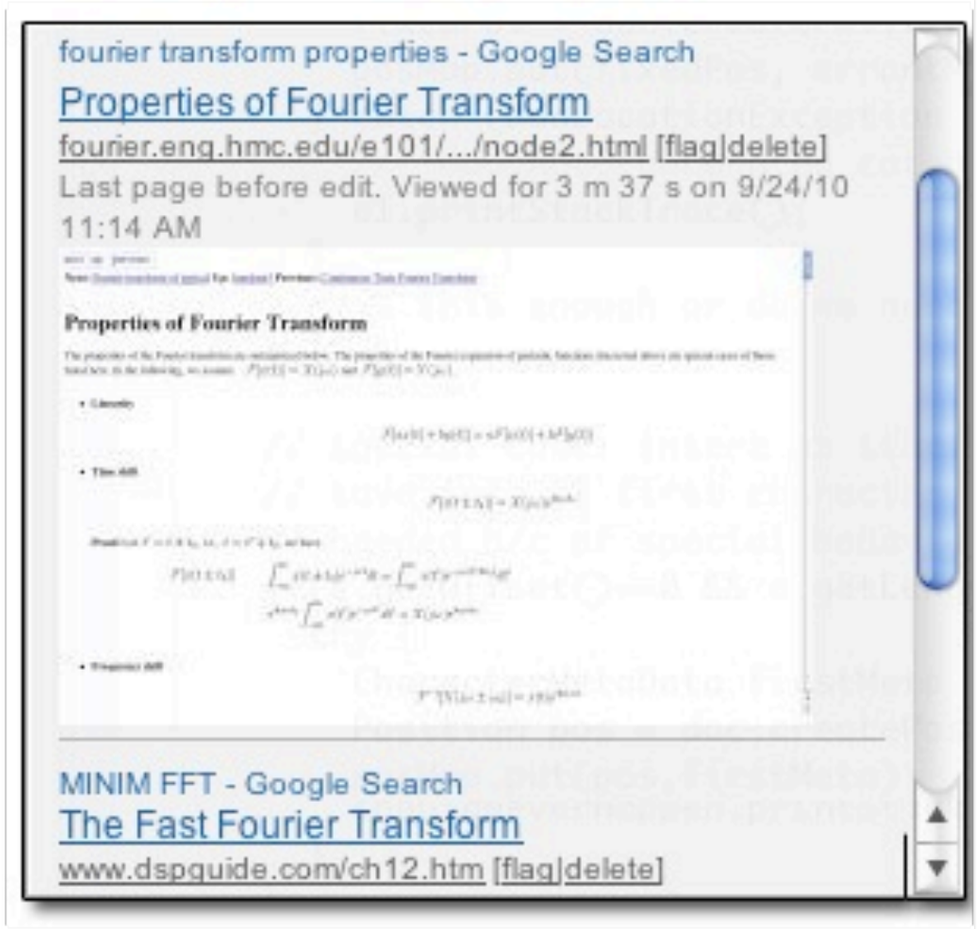

Code Editor
Web Browser
http://code.google.com/...

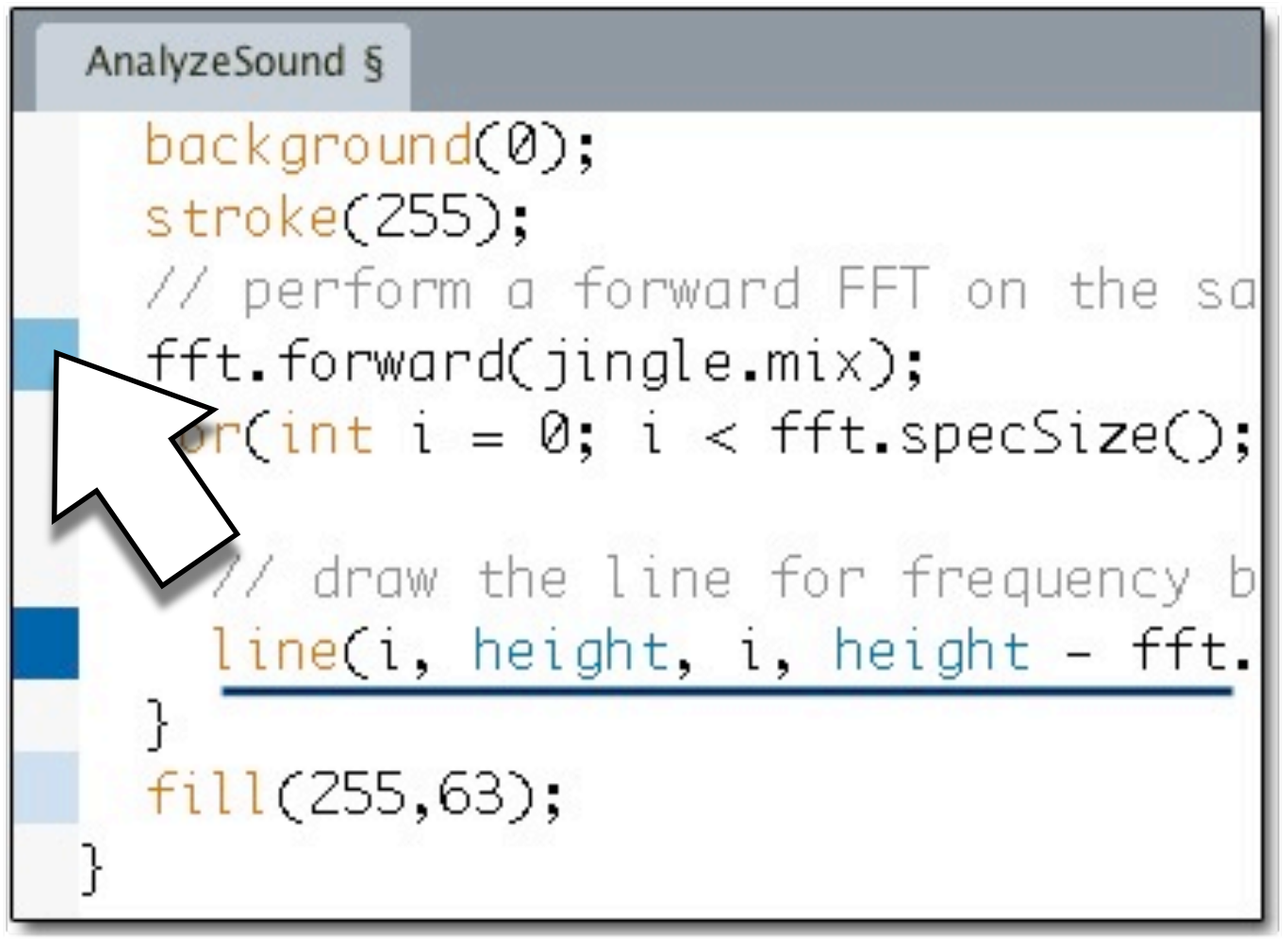
Line Highlight

AnalyzeSound §

```
  background(0);
  stroke(255);
  // perform a forward FFT on the sa
  fft.forward(jingle.mix);
  or(int i = 0; i < fft.specSize();

    // draw the line for frequency b
    line(i, height, i, height - fft.
  }
  fill(255,63);
}
```


fourier transform properties - Google Search
Properties of Fourier Transform
fourier.eng.hmc.edu/e101/.../node2.html [flag]delete]
Last page before edit. Viewed for 3 m 37 s on 9/24/10 11:14 AM
Properties of Fourier Transform
MINIM FFT - Google Search
The Fast Fourier Transform
www.dspguide.com/ch12.htm [flag]delete]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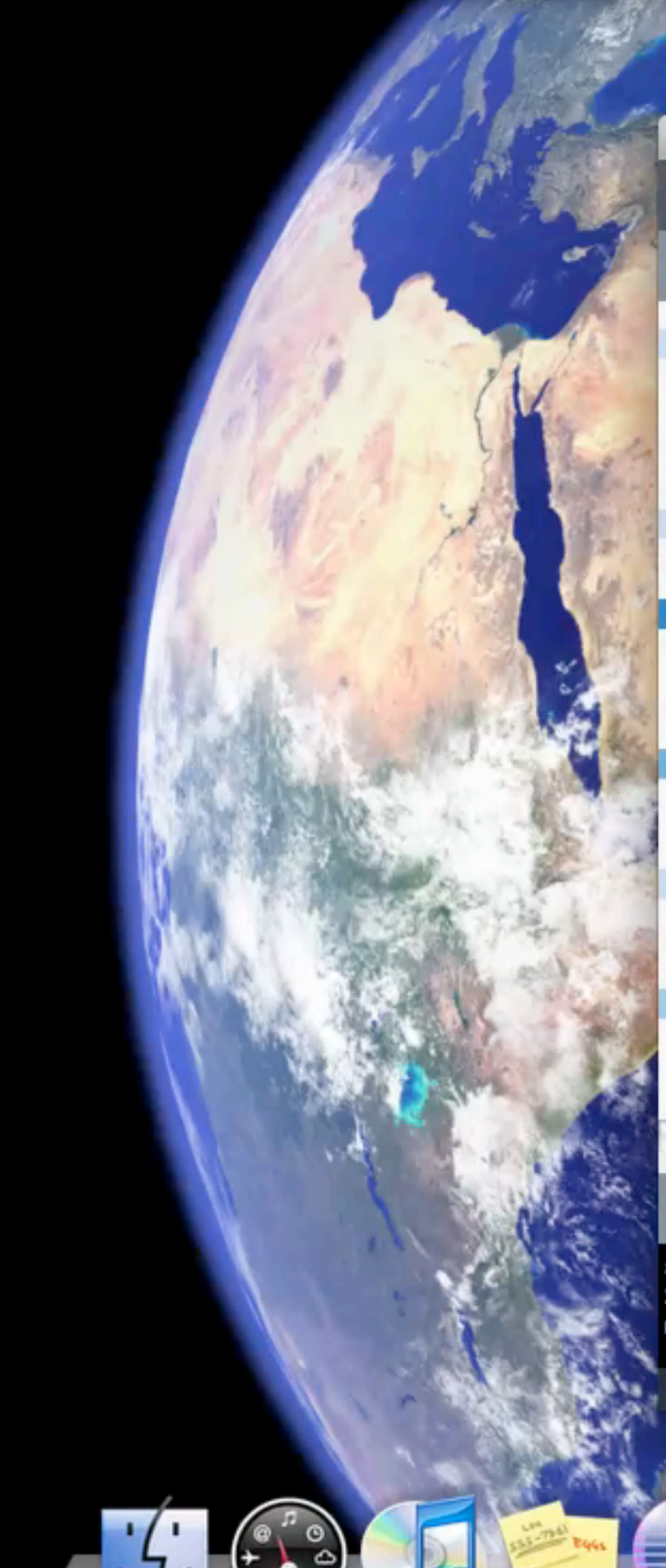

sketch_sep23a | Processing 0178

sketch_sep23a §

```
                        returnVal = SINGLE_NODES.length;
                        break;
                }
                return returnVal;
        }

        public static List<Object> parse(NodeList list, int type) {
                List<Object> returnVals = new ArrayList<Object>();

                for (int i = 0; i < list.getLength(); i++) {
                        Element elem = (Element) list.item(i);
                        Object currentVals = new Object();
                        if (elem.hasAttribute("id")) {
                                elem.getAttribute("id");
                        }
                        NodeList elemkids = elem.getChildNodes();
                        if (elem.getNodeName().equals("genre") || elem.getNodeName().equals("style")) {
                                // Then we're dealing with <genre> or <style> parsing
                                if (elem.getTextContent().contains(("&"))) {
                                        System.out.println(elem.getTextContent());
                                }
                                elem.getTextContent();
                        } else {
                                int numKidsFound = 0;
                                for (int j = 0; j < elemKids.getLength(); j++) {
                                        if (numKidsFound == getNodeCount(type)) {
                                                break;
```

Android mode canceled.

```
set width:240
Size of log: 3
numEdits=0
```

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IPC

Editor Extension

Code Editor

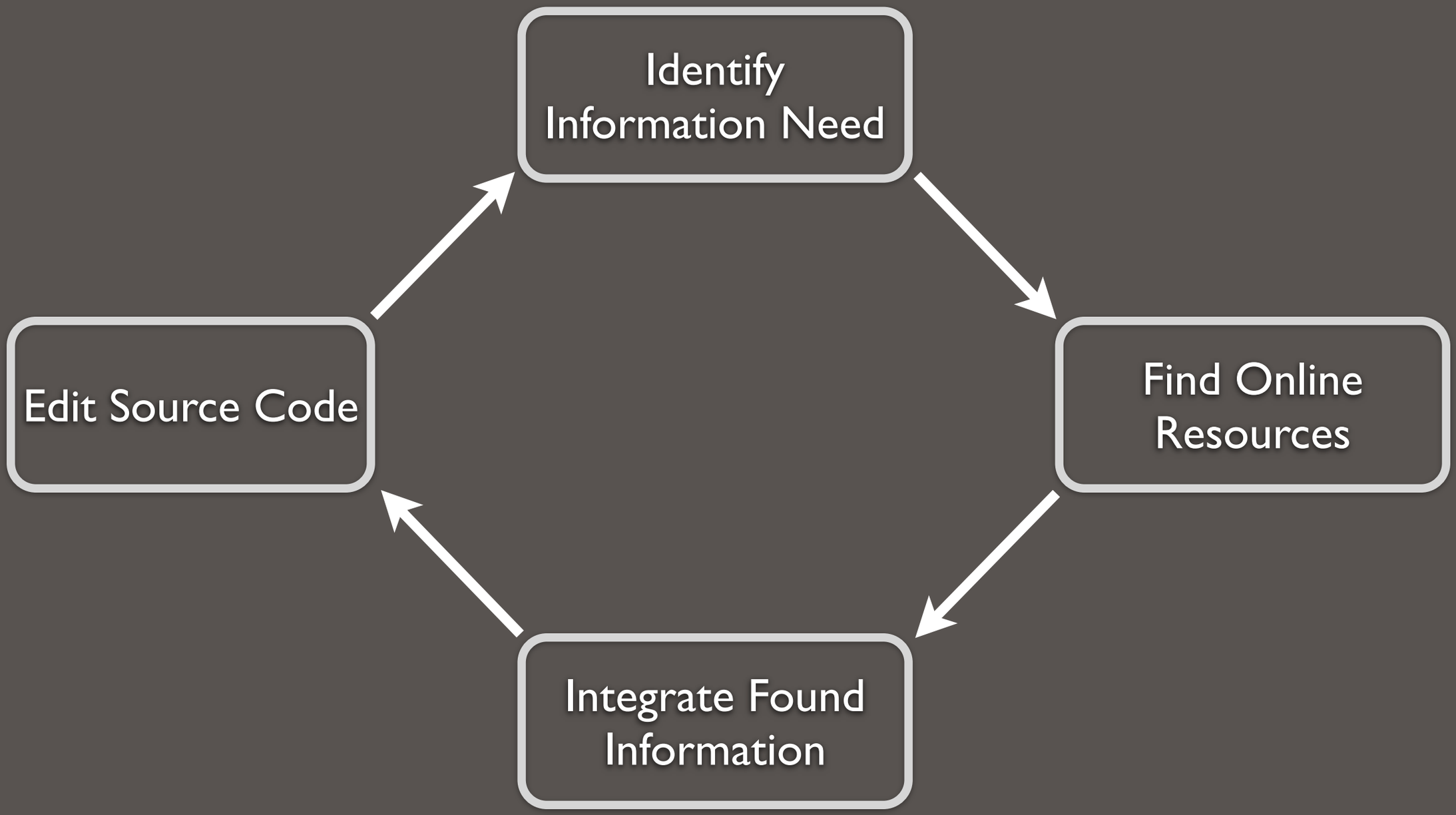
Processing
& jEdit

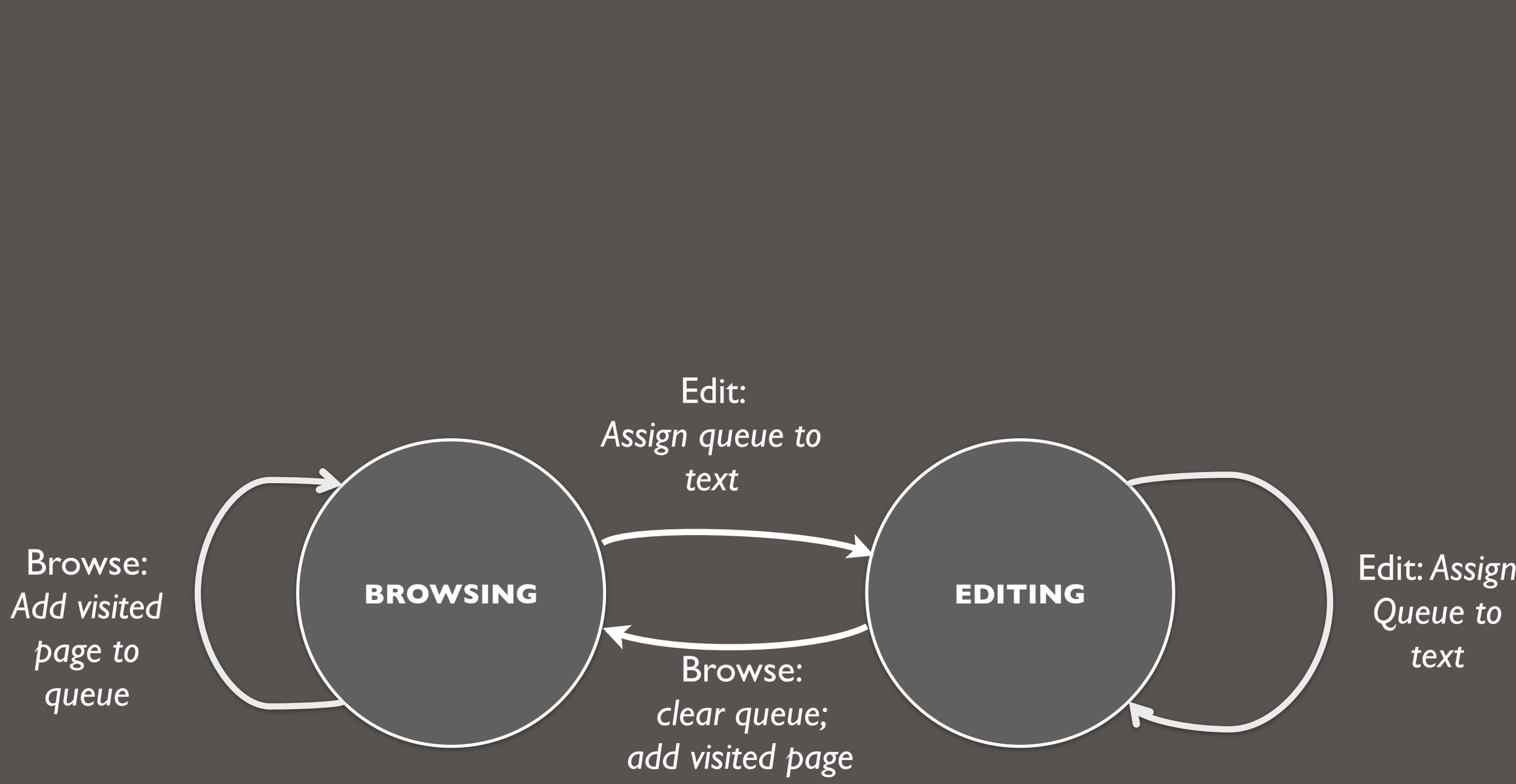
Disk

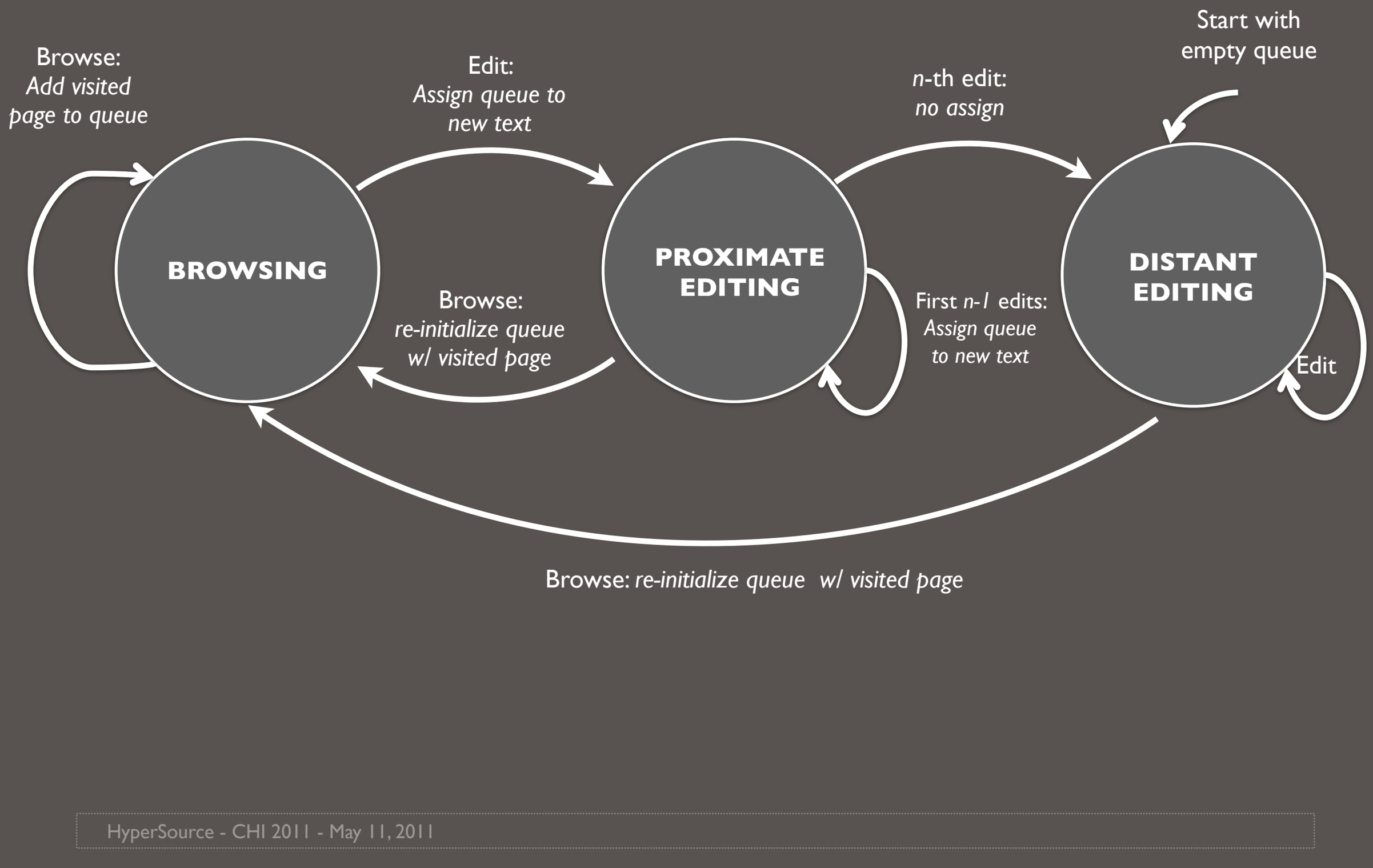
Browser Plug-In

Web Browser

Google Chrome


Identify Information Need
Find Online Resources
Integrate Found Information
Edit Source Code


Edit:
Assign queue to text
Browse:
Add visited page to queue
BROWSING
EDITING
Edit: *Assign Queue to text*
Browse:
clear queue; add visited page


Browse:
Add visited page to queue
BROWSING
Edit:
Assign queue to new text
Browse:
re-initialize queue w/ visited page
PROXIMATE EDITING
n-th edit:
no assign
First *n-1* edits:
Assign queue to new text
Start with empty queue
DISTANT EDITING
Edit
Browse: *re-initialize queue w/ visited page*

Maintaining annotations through edits

Insert(2,"y+")

Code

r	=	f	(	x	)	;
0	1	2	3	**4**	5	6

r	=	y	+	f	(	x	)	;
0	1	2	3	4	5	**6**	7	8

Pages

URL Set 1
http://google.com/..
http://forum.xyz.co

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http://google.com/..
http://forum.xyz.co

Recording Too Much Data?

1. Page filtering
    1. Domain blacklists
    2. "Clear Queue"
    3. Delete individual items

Recording Too Much Data?

1. Page filtering
    1. Domain blacklists
    2. "Clear Queue"
    3. Delete individual items
2. Relevance heuristics
    1. Copy & paste
    2. Final page before editing
    3. Explicit mark

User Experiences

How much code gets annotated?

2 hours programming competition with HyperSource (n=4):

	mean	min	max
Web Pages visited	37	26	49
Code lines annotated	**7**/141	**5**/102	**9**/177

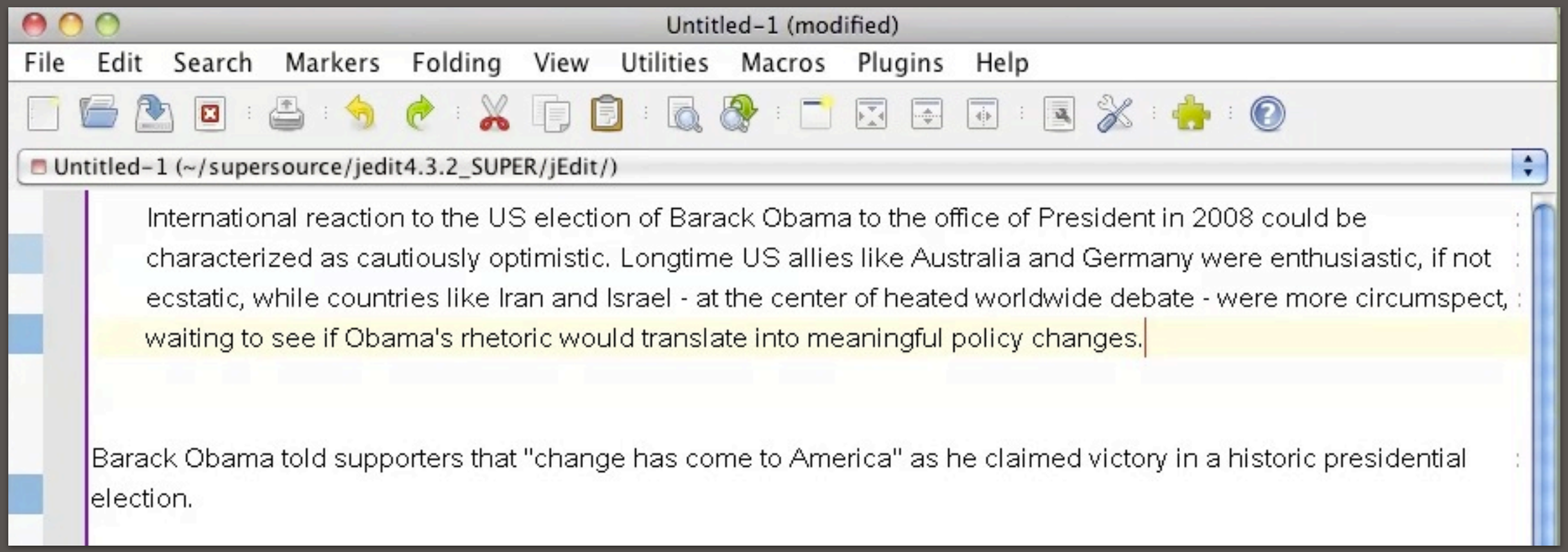
How useful are annotations?

Review source files with and without annotations, then answer a series of questions about code (n=4).

Survey feedback:

- Helped understand unfamiliar code:
  "It was much easier to answer the questions with the annotated URLs"
- Web pages were used as starting points

Can this approach apply to other authoring tasks?



HyperSource

Collects visited web pages and associate them with lines of code that developers subsequently write.

Tracks and shows associations within each source file.

Questions: **bjoern**@cs.berkeley.edu
cs.berkeley.edu/~bjoern