Debugging Mobile Web Applications with weinre

for OSCON 2011
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blah blah blah

copy of this presentation available at:

    http://muellerware.org/papers/

underlined text in this presentation is a link to a web page
resources

• documentation - http://phonegap.github.com/weinre/

• source / issue tracker - https://github.com/phonegap/weinre

• discussion - http://groups.google.com/group/weinre

• Chrome Developer Tools - http://code.google.com/chrome/devtools/docs/overview.html

• this doc gives a good overview of Real Web Inspector
“weinre” pronunciation

• like “winery”
• not like “weiner” or “wiener”
• I don’t really care
• weinre === Web Inspector Remote

• reuses WebKit’s Web Inspector user interface

• works remotely - debug a web page running on a device from your desktop

• mobile web applications - web pages running in a mobile browser or in a native mobile app using a browsing control (eg PhoneGap)

• debug those web applications
how does it work?

• access a public weinre server or run your own

• add a `<script src=>` into pages you want to debug; the src attribute points to a `.js` file provided by the weinre server

• run the web application on your device

• access the debugging user interface (a web page) from the weinre server from your desktop

• debug!
supported features

• DOM / CSS inspector
  • inspect / edit / delete DOM elements and CSS rules
• localStorage / WebSQL inspector
• event timeline
  • add your own events to the timeline
• console
  • run arbitrary JavaScript code in your web page
DOM / CSS inspector
sql / localStorage inspector
event timeline
console

```
> document.body.style.backgroundColor = "green"
"green"
> document.body.style.backgroundColor = ""
```

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not supported

• JavaScript debugging; no breakpoints / pausing / stepping
• most of the networking diagnostics
• most of the resource diagnostics
• profiling
• audits
why is <XYZ> not supported?

• in some cases, the work has not been done yet

• in other cases, not possible or very hard, usually because:
  • weinre is written using plain old JavaScript
  • no JavaScript APIs for breakpoints/stepping JavaScript code
  • no JavaScript APIs for low-level resource information
demo

find a demo on YouTube:
http://www.youtube.com/results?search_query=weinre
terminology

- debug target - the web page you want to debug
- debug client - the web page showing the Web Inspector user interface
- debug server - the HTTP server which services as a message switchboard between the debug target and debug client
using weinre

• Two options:
  • use debug.phonegap.com, hosted by Nitobi (thanks!)
  • download the server and run it yourself
debug.phonegap.com

Getting Started

Step 1: select your guid (or just use the one we’ve randomly assigned)

42

Step 2: inject this script into your index.html

<script src="http://debug.phonegap.com/target/target-script-min.js#42"></script>

Step 3: click this link to start debugging

http://debug.phonegap.com/client/#42

powered by weinre
pick a guid / unique id

- weinre does not use any kind of security between debug clients and targets
- the unique id keeps other people’s debug clients from connecting to your debug target
- if you want to collaboratively debug, share your unique id with a colleague
run your own server

• download / unzip the “jar” build from https://github.com/phonegap/weinre/downloads

• run “java -jar weinre.jar --boundHost -all-”

• requires Java

• add the following to your web page, and reload it:
  
  <script src="http://[server-ip]:8081/target/target-script-min.js">  
  </script>
run your own server (continued)

- browse to http://localhost:8080
- the “Remote” panel should list your web application in green
- that means it’s connected
- start debugging!
connected to your server
hard part using your own server: the server’s ip address

• aka “bound host”

• --boundHost -all- option allows all ip address on the box to act as server; default is localhost

• server’s ip address goes in the <script src=/> element embedded in your web application

• that ip address must be reachable from your device to your server

• probably not 127.0.0.1 or localhost (maybe for emulator)
what’s your server’s ip address?

- Windows command line: `ipconfig`
- Mac/Linux command line: `ifconfig`
- weinre on your desktop: `http://localhost:8080/client`
weinre knows your bound hosts
problem: your ip address changes
solution: dynamic dns service

• your ip address probably changes every day

• meaning you need to change the URL in your web pages every day

• pro-tip: use a dynamic dns service with an update client

• now you can use a host name that never changes
server command-line options

• see: http://phonegap.github.com/weinre/Running.html

• “--boundHost -all-” allows you to connect to the server from another machine (default only allows connections from same machine)

• “--httpPort <number>” allows you to change the server port
running the Mac application

• a Mac application is also available

• runs the server in a window which also displays the Web Inspector user interface

• built using Eclipse SWT - theoretically possible to port to Windows / Linux
mac app
bookmarklet

• possible to inject weinre target code into any web page with a bookmarklet

• instructions available on weinre’s main server page (when you run the server)

• not trivial to install on iOS or Android, and requires modern version of Android
collaborative debug

• multiple debug clients can connect to a single debug target
• must use a shared unique id
• not well tested
• not a design feature, just the way the web works
future
should be dim

• WebKit now has Remote Web Inspector baked in
  http://www.webkit.org/blog/1620/webkit-remote-debugging/

• RIM shipping Remote Web Inspector for Playbook

• Apple? Don’t know, or if I did, I’d have to kill you, then myself.

• Google? “I'm afraid we have no plans right now to enable this feature.”
  http://bit.ly/r1clCt (webkit-dev mailing list)
easier / better
PhoneGap integration

• examples:
  • auto-inject weinre JavaScript code into your app
  • diagnostics for PhoneGap-provided events
  • run weinre server IN your app
current issues logged

• **port the server to node.js, use socket.io for communications**

  • allows removal of the “message queue” code in Java and JavaScript

  • allows WebSocket usage, for better latency / less overhead (instead of XHR)

• allows reuse of code between server and browser (wouldn’t be much though)
current issues logged

- extension system that works
  - there is an extension mechanism in place today, based on Web Inspector’s extension mechanism
  - allows adding new panels, and any other hacking
  - hard/impossible to use; needs a re-write
current issues logged

• provide better error handling
  • error support not great for mobile devices - “onerror” not yet ubiquitous
  • can hook event handlers to provide try/catch with diagnostics for callbacks
  • catching errors at initial load time is still hard
until then

• if you need something fixed or added:
  • write a bug - https://github.com/phonegap/weinre/issues
  • ask a question - https://groups.google.com/group/weinre
  • DIY / fork it - https://github.com/phonegap
innards
target / server / communication
communication

• Web Inspector:
  • defines JSON-able messages sent between client and target
  • provides service framework to hook in message handlers
  • provides hooks at start-up time to start your own infrastructure
console.log("hello, world")

{
    interface: "ConsoleNotify",
    method: "addConsoleMessage",
    args: [
        {
            message: "hello, world",
            level: 1,
            source: 3,
            type: 0,
            parameters: [
                {
                    hasChildren: false,
                    description: "hello, world",
                    type: "string"
                }
            ]
        }
    ]
}
message interface / methods

- specified in WebKit via:
  - old: WebIDL-ish files (weinre currently using this version), converted to JSON in weinre build
  - new: JSON files

- data sent in messages not defined - “read the source”
to implement weinre ... 

- target must respond to client’s messages correctly
- target must send events correctly
- basically, implement the target code - for Real Web Inspector, this is mainly C++, with some in JavaScript (we reuse their JavaScript)
- set up message queue and dispatch interface in target and client
HTTP usage

• client and target use the same JavaScript framework for message sending / receiving

• message queue-ish, REST-ish, implemented with XHR (not WebSocket)

• requires Cross-Origin Resource Sharing (CORS) to let target communicate, cross-origin, to weinre server

• target and client do not communicate directly, always through server
HTTP / XHR message flow

GET messages

POST message

POST message

GET messages
source
• Apache CLI - command line parser used by the server
• Eclipse Jetty - HTTP server used by the server (it’s not a .war)
• Apache Wink JSON4J - JSON code for Java from used by server
• WebKit’s Web Inspector - user interface used by the client
Web Inspector reuse

JavaScript: 116 files 48,000 lines 1.7 MB
CSS: 9 files 6,200 lines 140 KB
HTML: 1 file 175 lines 1.2 KB

• Almost all of this is for the “client” - the debugger user interface

• WebKit-specific, won’t run on FireFox, IE, Opera, etc
JavaScript modules

• almost all JavaScript:
  • written as CommonJS modules, using modjewel
  • written as in classical OO style using scooj preprocessor
  • looking at automagically porting from scooj to CoffeeScript using js2coffee
build script

• monster Ant script
  • downloads pre-reqs (if not already downloaded)
  • compile Java (optional, can also use Eclipse to do that)
  • bundle all the junk together
• if we port the server to node.js, will convert to a Makefile