Closure Compiler:

Speeding Web Appications by Compiling JavaScript

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Outline

- What is it and what does it do?
- More advanced usage
- How do I get started?
- Questions?

Building Large Scale Web Applications

Faster websites = more business and traffic!

Our apps are big, and our teams are large

- How do we decrease latency with 100KLOC webapps?
- How do we share functionality in a library without code bloat?

- How do we help developers catch bugs sooner?

- How do we help projects with hundreds of developers?

What is Closure Compiler?

- Source-To-Source Javascript Compiler
- Closure Compiler do more than Javascript minifications
- Leveraged compiler optimizations and static analysis techniques
- Integrated a static type system in a dynamic language
- Introduce a module loading system and optimizations for it
- Open sourced!!!!

Who uses it?

Google Web Search, Gmail, Google Docs, Google Spreadsheets, Google Presentation, Calendar, Blogger Google Maps, Google Books, Google Analytics, Google Finance ...

Externally: used by JQuery and growing!

Productivity!

Detect Errors Before Runtime

- Variable Checks
- Property Checks
- Control Flow Structure Checks
- Browser Specific Quirks
- Many more to help you detect errors before it happens!

Type Check and Type Inference

```
/** @constructor */
function Apple() {}

/** @param {Apple!} a */
function store(a) {}
```

Type Check and Type Inference

```
/** @constructor */
function Apple() {}

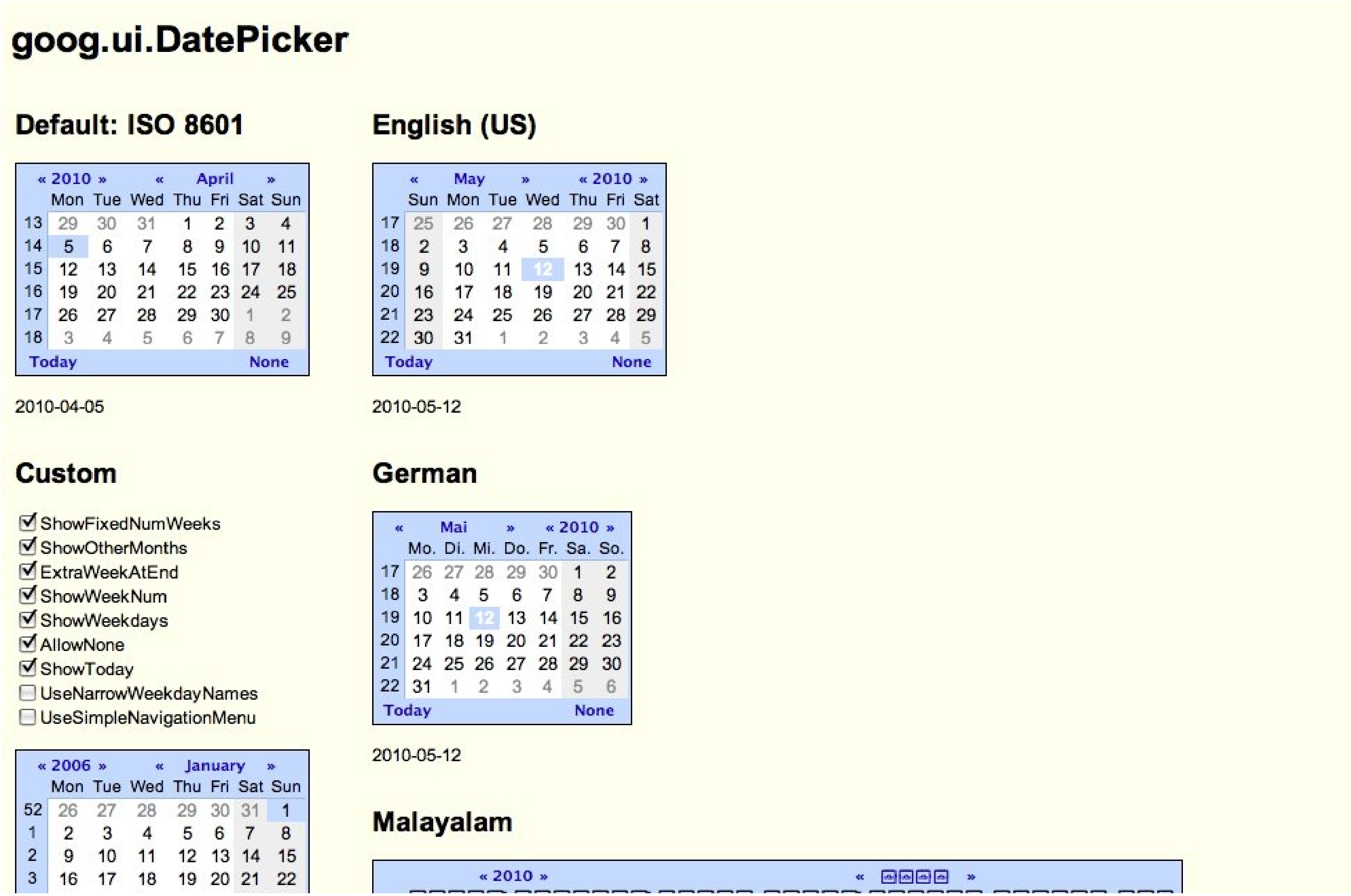
/** @param {Apple!} a */
function store(a) {}

var x = getRandomFruit();

if (x instanceof Apple) {
 var y = x;
  ....
 store(y);
}
```

Performance!

Example Compression: Closure's Date Picker Example



goog.ui.DatePicker

Default: ISO 8601

« 2010 »   « April »

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
13	29	30	31	1	2	3	4
14	5	6	7	8	9	10	11
15	12	13	14	15	16	17	18
16	19	20	21	22	23	24	25
17	26	27	28	29	30	1	2
18	3	4	5	6	7	8	9

Today   None

2010-04-05

Custom

- ☑ ShowFixedNumWeeks
- ☑ ShowOtherMonths
- ☑ ExtraWeekAtEnd
- ☑ ShowWeekNum
- ☑ ShowWeekdays
- ☑ AllowNone
- ☑ ShowToday
- ☐ UseNarrowWeekdayNames
- ☐ UseSimpleNavigationMenu

« 2006 »   « January »

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
52	26	27	28	29	30	31	1
1	2	3	4	5	6	7	8
2	9	10	11	12	13	14	15
3	16	17	18	19	20	21	22

English (US)

« May »   « 2010 »

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
17	25	26	27	28	29	30	1
18	2	3	4	5	6	7	8
19	9	10	11	12	13	14	15
20	16	17	18	19	20	21	22
21	23	24	25	26	27	28	29
22	30	31	1	2	3	4	5

Today   None

2010-05-12

German

« Mai »   « 2010 »

	Mo.	Di.	Mi.	Do.	Fr.	Sa.	So.
17	26	27	28	29	30	1	2
18	3	4	5	6	7	8	9
19	10	11	12	13	14	15	16
20	17	18	19	20	21	22	23
21	24	25	26	27	28	29	30
22	31	1	2	3	4	5	6

Today   None

2010-05-12

Malayalam

« 2010 »   « [illegible] »

File Sizes for Date Picker Example

	Original	Compression: Whitespace	Compression: Simple	Compression: Advanced
Uncompressed size	701 KB (0%)	351 KB (50%)	301 KB (58%)	33 KB (95%)
Gzip size	146 KB (0%)	61 KB (58%)	55 KB (62%)	12 KB (92%)
Time to load page		800 ms	700 ms	474 ms

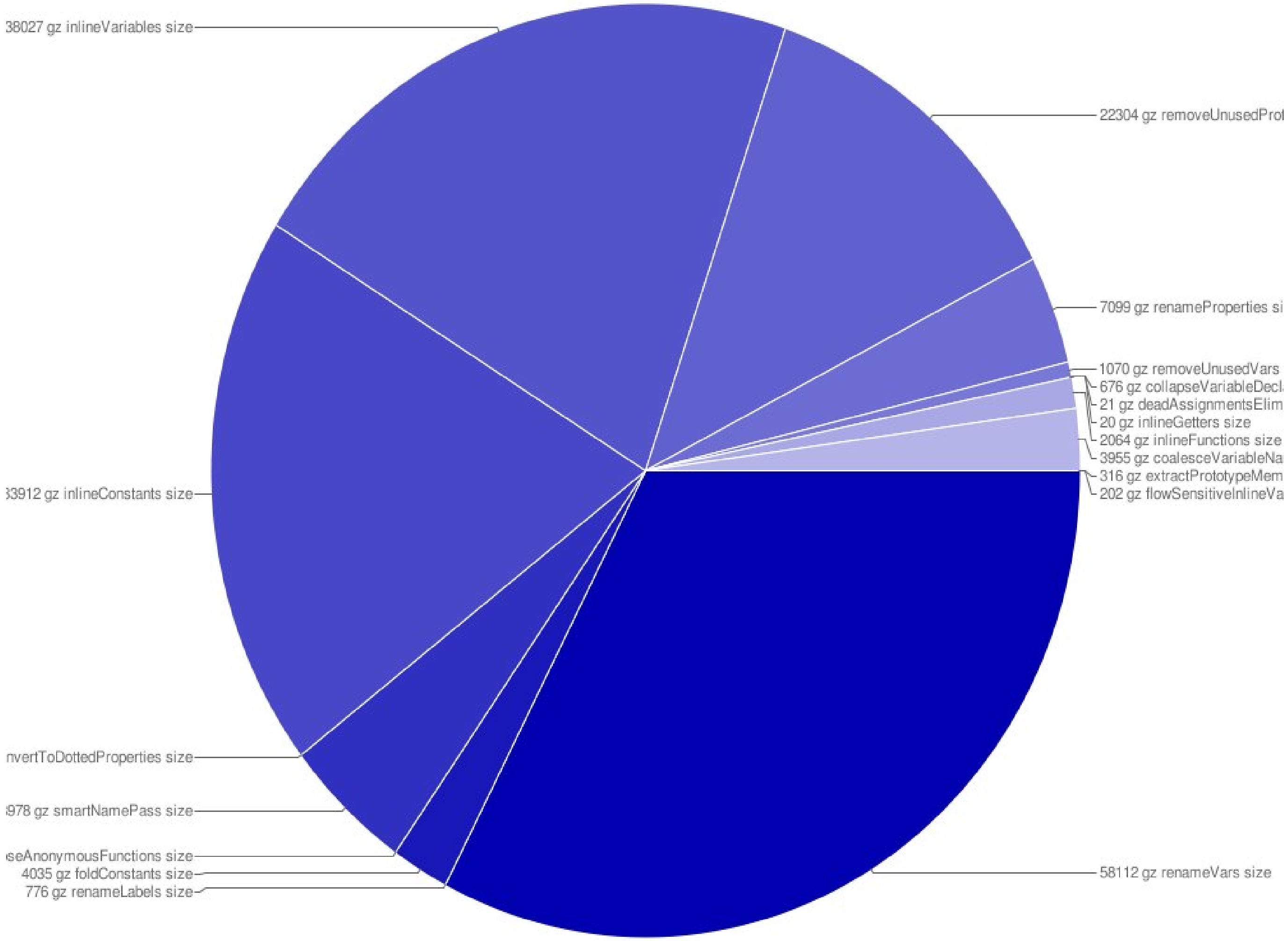
Lots of Optimizations

Lots of Optimizations

- Rename Variables
- Rename Properties
- Rename Labels
- Inline Functions
- Inline Variables
- Optimize Arguments
- Chain Calls
- Remove Dead Code
- Remove Dead Assignments
- Remove Unused Variables
- Remove Unused Properties

- Alias Strings
- Alias Keywords
- Collapse Properties
- Devirtualize Functions
- Side Effect Computations
- Rewrite Common Functions
- Coalesce Variable Names
- .... MANY MORE!!!!

Lots of Optimizations



~30% Renaming
~30% Inlining
~15% Dead Code

Examples of Optimizations: Constant Folding

```
if (x < (lineLength - (ellipsisLength * 2))) {
```

becomes

```
if (x < 74) {
```

Examples of Optimizations: Coalesce Variable Names

myVar = 3; otherVar = myVar + c; fVar = otherVar++;

becomes

a =3; a = a + c; a++;

Examples of Optimizations: Function Inlining

```
function fieldValue() {
    return field + offset;
}
y = fieldValue();
```

becomes

```
y = field + offset;
```

Examples of Optimizations: Simple Common Subexpression

```
Foo.prototype.bar1 = ....
Foo.prototype.bar2 = ....
```

becomes

```
t = Foo.prototype;
t.bar1 = ...
t.bar2 = ...
```

Examples of Optimizations: Collapse Properties

```
goog.ui.messages.foo = function() { ....
goog.ui.messages.foo();
```

becomes

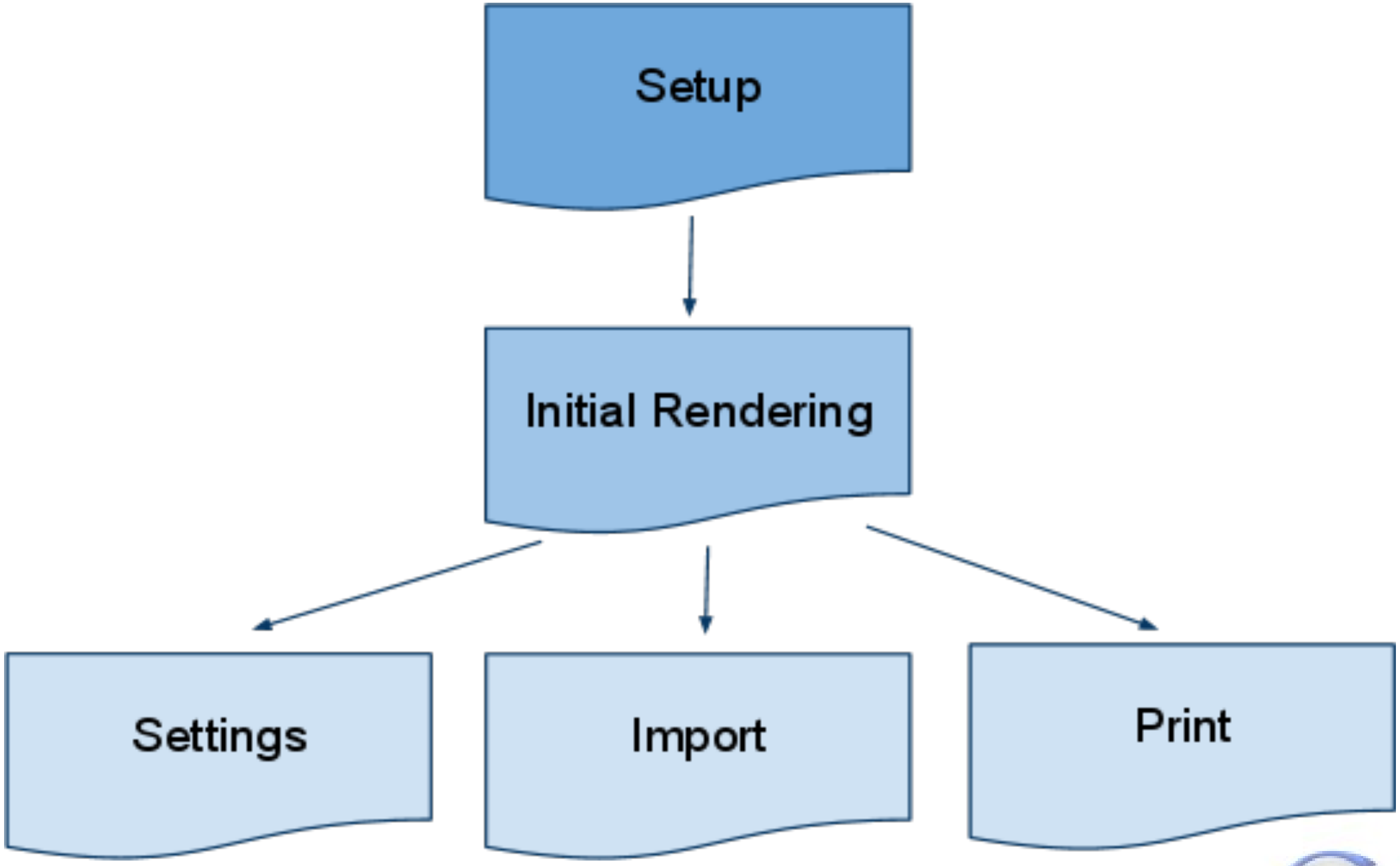
```
goog$ui$messages$foo = function () { ...
goog$ui$messages$foo();
```

becomes (with Variable Renaming)

```
a = function() {.,..
a();
```

Cool Optimizations: Cross-module Code Motion

Modules



Cross Module Code motion

```
// Init Mod
function Graph() { ... }
Graph.prototype.display = function() { ... };
Graph.prototype.resize = function() { ... };
var g = new Graph();

// Render Mod
g.display();

// Resize Mod
g.resize();
```

Cross Module Code motion

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Cross Module Code motion

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var g = new Graph();

// Render Mod
Graph.prototype.display = function() { ... };
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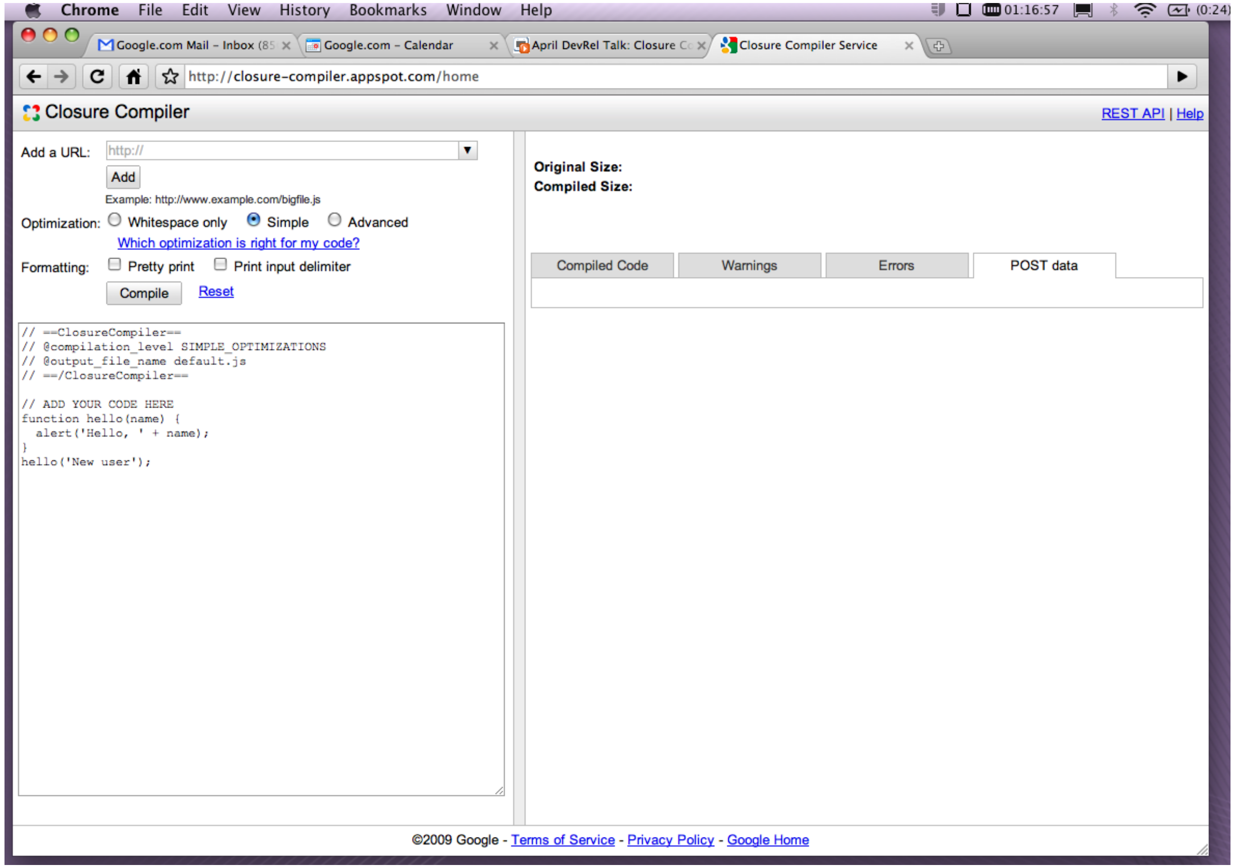
g.resize();
```

How to use Closure Compiler

Online (Interactive and REST API):
http://closure-compiler.appspot.com



Chrome File Edit View History Bookmarks Window Help
01:16:57 (0:24)
Google.com Mail - Inbox (85
Google.com - Calendar
April DevRel Talk: Closure Co
Closure Compiler Service
http://closure-compiler.appspot.com/home
REST API | Help
Original Size:
Compiled Size:
Compiled Code
Warnings
Errors
POST data
©2009 Google - Terms of Service - Privacy Policy - Google Home

Closure Compiler

Add a URL: http://

Add

Example: http://www.example.com/bigfile.js

Optimization: ○ Whitespace only ● Simple ○ Advanced

Which optimization is right for my code?

Formatting: □ Pretty print □ Print input delimiter

Compile Reset

```
// ==ClosureCompiler==
// @compilation_level SIMPLE_OPTIMIZATIONS
// @output_file_name default.js
// ==/ClosureCompiler==

// ADD YOUR CODE HERE
function hello(name) {
  alert('Hello, ' + name);
}
hello('New user');
```

How to use Closure Compiler

Download and use it:

```
java -jar compiler.jar --js my1.js --js_output_file out.js
```

Sources, binaries, discussion and feature requests at:

http://closure-compiler.googlecode.com

Questions