Google's Closure Tools

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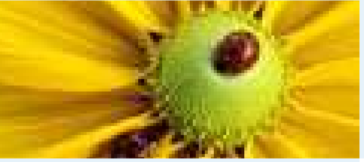

Closure Tools

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Linter
Compiler
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Optimization
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Name mangling
Modules
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Gotchas
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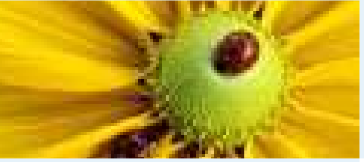
Demonstration

- Library
- **Compiler**
- Linter
- Templates
- Stylesheets

$\rightarrow$ http://code.google.com/closure/



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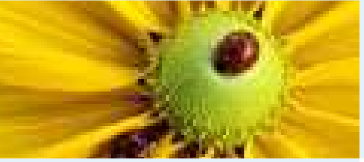
- Extensive
- Modular
- Cross-browser
- Tested
- Well documented
- A “standard library” for Javascript

→ http://code.google.com/closure/library/



Stylesheets and templates

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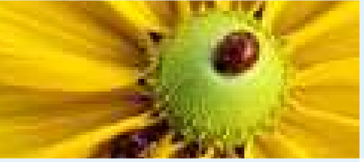
Stylesheets:

- CSS with a pre-processor (*c.f.* less)
- Class renaming
- Optimization / compresssion

Templates:

- Client (JS) and server-side (Java)
- Integrates with CSS class renaming



Linter

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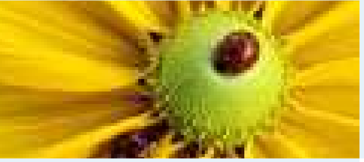
- Common sources of error
- Coding style

→ http://code.google.com/p/google-styleguide/



Compiler

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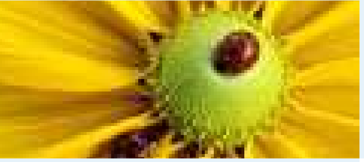
- Compiles Javascript to smaller, faster Javascript
- Output is a monolithic Javascript file
- Minimiser
- Optimiser
- Tightly integrated with library

→ http://code.google.com/closure/compiler/



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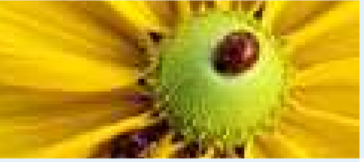
Humans want:

- Code with clear intent
- Well-structured code
- Testing and debugging support

Computers want:

- Compact code
- Code that runs fast
- No unnecessary code



Optimization

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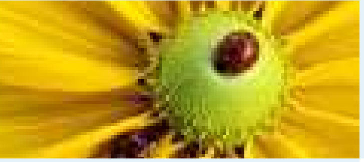
- Smaller
- Faster
- Correct
- Compresses well
- Removes dead code

→ http://code.google.com/p/closure-compiler/source/browse/



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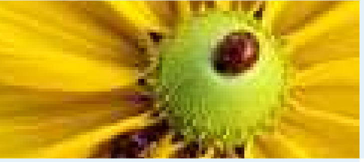
1. Whitespace only
2. Simple optimizations ($1.25\times$, $1.5\times$ gzip'ed)
3. Advanced optimizations ($4\times$, $8\times$ gzip'ed)



Language extensions

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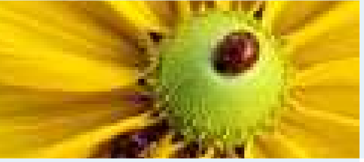
- Uses @jsdoc tags in comments
- Strict, static type checking
- Classical inheritance with constructors and interfaces
- Public, protected and private methods and attributes
- Constants, typedefs and enums
- Pre-processor
- Special treatment of `goog.base`
- No `eval`

→ http://code.google.com/closure/compiler/docs/js-for-compiler.html
→ http://code.google.com/closure/compiler/docs/limitations.html



Name mangling

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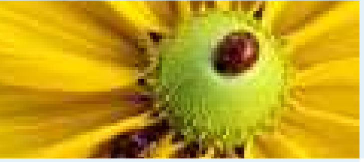
- Internally consistent
- Properties only, not strings
  - `obj.prop = obj['prop'] + 1; // wrong...`
  - `o.p = o['prop'] + 1; // ...when compiled`
- Need to explicitly specify exported symbols ("exports")
- Need to explicitly specify imported symbols ("externs")
- Can write interface files for external libraries

→ http://code.google.com/closure/compiler/docs/api-tutorial3.html



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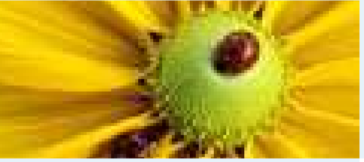
- In each source file (module):
  - Declare provides with `goog.provides`
  - Declare requirements with `goog.require`
- Throw everything at `depswriter.py`/`closurebuilder.py`
- Emits only what you need (custom builds :-))



Uncompiled code

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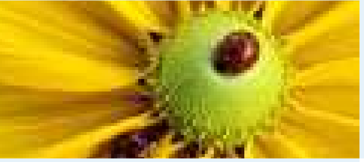
- Load three scripts:
  1. `<script src="closure/goog/base.js">`
  2. `<script src="deps.js">`
  3. `<script>goog.require('my.module');</script>`
- `depswriter.py` generates `deps.js` (the map between modules and source files)
- `goog.require` loads source files as needed
- Great for debugging

→ http://code.google.com/closure/library/docs/depswriter.html



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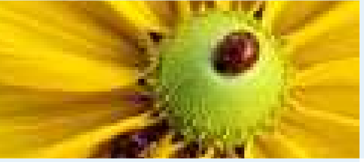
- `closurebuilder.py` builds monolithic JS files
- Load one script:
  - `<script src="compiled.js">`
- Pass `--namespace=my.module` to `closurebuilder.py` to set the "main" module
- Hard to debug
- FireBug extension

→ http://code.google.com/closure/library/docs/closurebuilder.html
→ http://code.google.com/closure/compiler/docs/inspector.html



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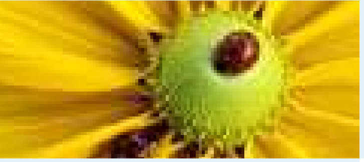
- Name mangling
- Mismatch from imposing strict typing on a dynamic language
- Differences between compiled and uncompiled code
- No `$(document).ready()` by design
- “Clever” Javascript libraries may not be compatible



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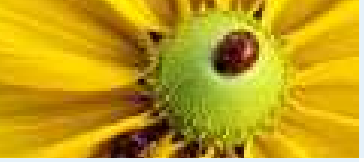
- Solves many problems with Javascript well
- Catches bugs early - speeds up development
- Tools work best when used together
- Debugging is OK
- Makes Javascript more like Java :-(/ :-)
- Refactoring required to use advanced optimizations
- Long compile times (JVM startup, but multithreaded)
- Needs a good build system
- Interfacing with external packages can be tiresome
- Very effective obfuscator :-)



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```
git clone https://github.com/twpayne/closure-toy.git
cd closure-toy
make
```