Project Ideas

CSE 4322 Fall 2013
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Overview

- Semester project
- Most likely 6 teams
- Each team consists of 3 to 4 students
- Following are project ideas
- You are most welcome to pitch your own ideas

TouchDevelop-style TypeScript IDE

PROJECT IDEA 1

Project Idea 1

- TouchDevelop-style TypeScript IDE
  - Context-sensitive
- Browser-based
  - Implemented in HTML5 / JavaScript / TypeScript
- Or in Android, iPhone, Java, etc.
- Probably too complex to implement from scratch
  - Reuse existing editors or IDEs
  - Reuse existing TypeScript compiler

TouchDevelop

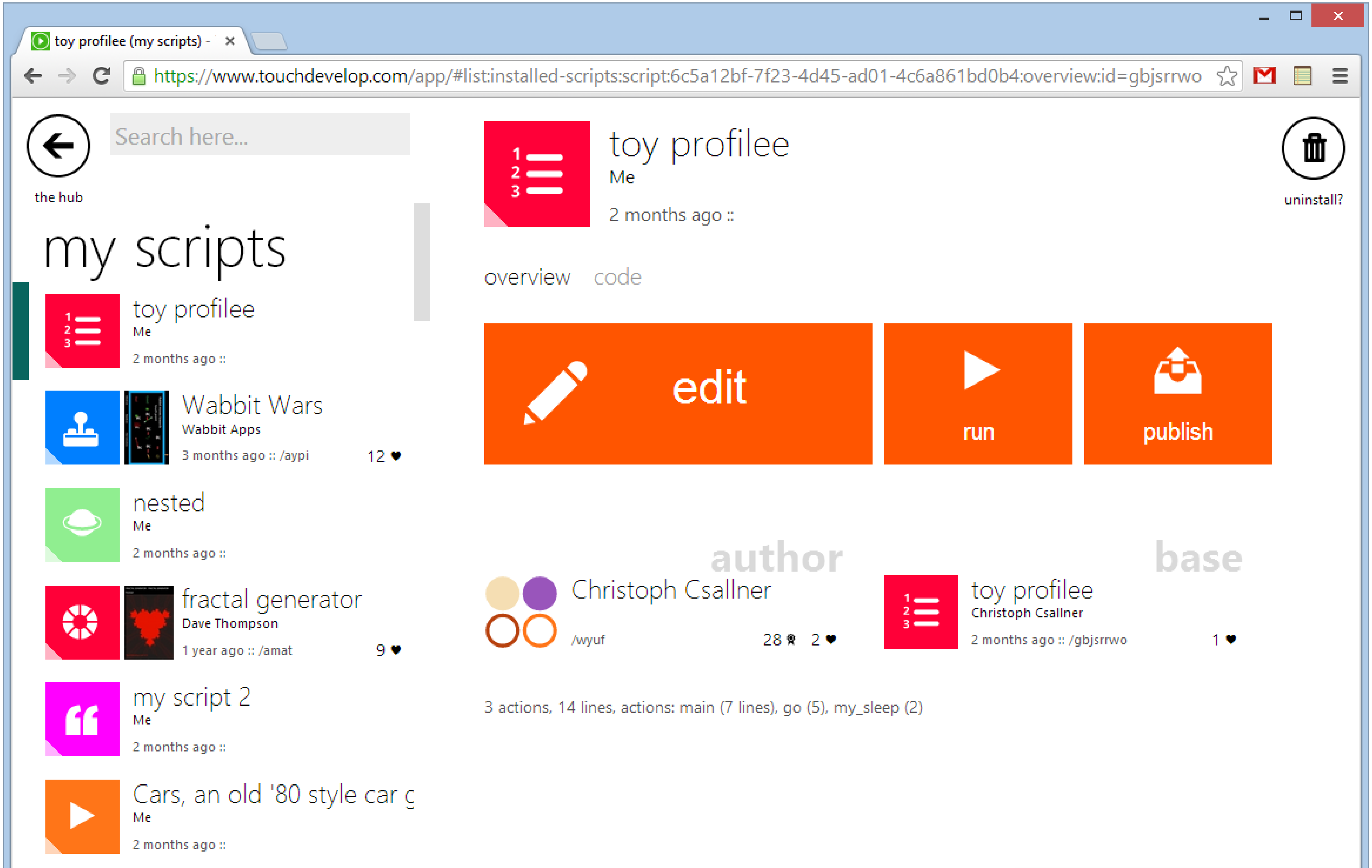
- TouchDevelop is a simple object-oriented langauge
- Simpler (smaller) than Java
  - Cannot define own classes
  - No inheritance
  - No method overriding
  - Fewer kinds of loops
- Language defined in free book (pdf):
  - https://www.touchdevelop.com/docs/book
- Used to teach programming to high school students
- Many short video tutorials on language features
  - https://www.touchdevelop.com/videos

TouchDevelop IDE

- Earlier the TouchDevelop IDE was a native Windows Phone 7 application
  - Written in C#
  - Only available via the Windows Phone Store
  - Only runs on Windows Phone 7
- Now there is a second version: Web-based
  - Mostly written in TypeScript
  - Runs on many web browsers on many platforms
    - Chrome on Windows desktop, etc.
    - iPhone / iPad browser (Safari)
- Following are screen shots from the web version

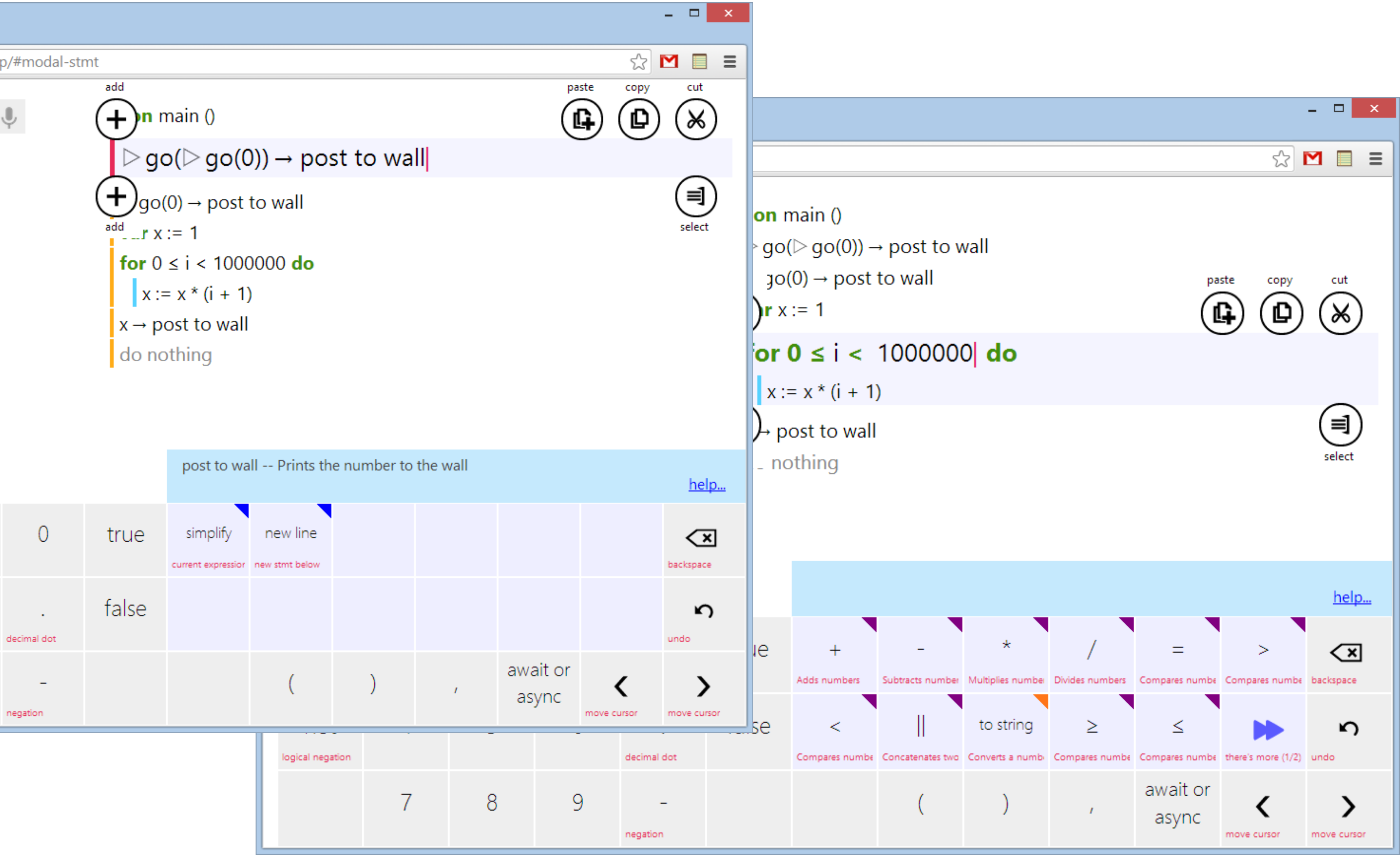
TouchDevelop IDE

- https://www.touchdevelop.com/



3 actions, 14 lines, actions: main (7 lines), go (5), my_sleep (2)

TouchDevelop IDE



```
p/#modal-stmt

on main ()
  ▷ go(▷ go(0)) → post to wall
  go(0) → post to wall
  _ _r x := 1
  for 0 ≤ i < 1000000 do
    x := x * (i + 1)
  x → post to wall
  do nothing
```

post to wall -- Prints the number to the wall

help...

```
on main ()
  go(▷ go(0)) → post to wall
  go(0) → post to wall
  r x := 1
  for 0 ≤ i <  1000000 do
    x := x * (i + 1)
  → post to wall
  _ nothing
```

help...

TouchDevelop IDE

- Context-sensitive
  - Present programmer with only those options that make sense at the current edit location
  - Related to auto-completion in Visual Studio / Eclipse IDEs
- Semi-structured editor
  - Programmer cannot just type anything
  - Help programmer avoid certain mistakes

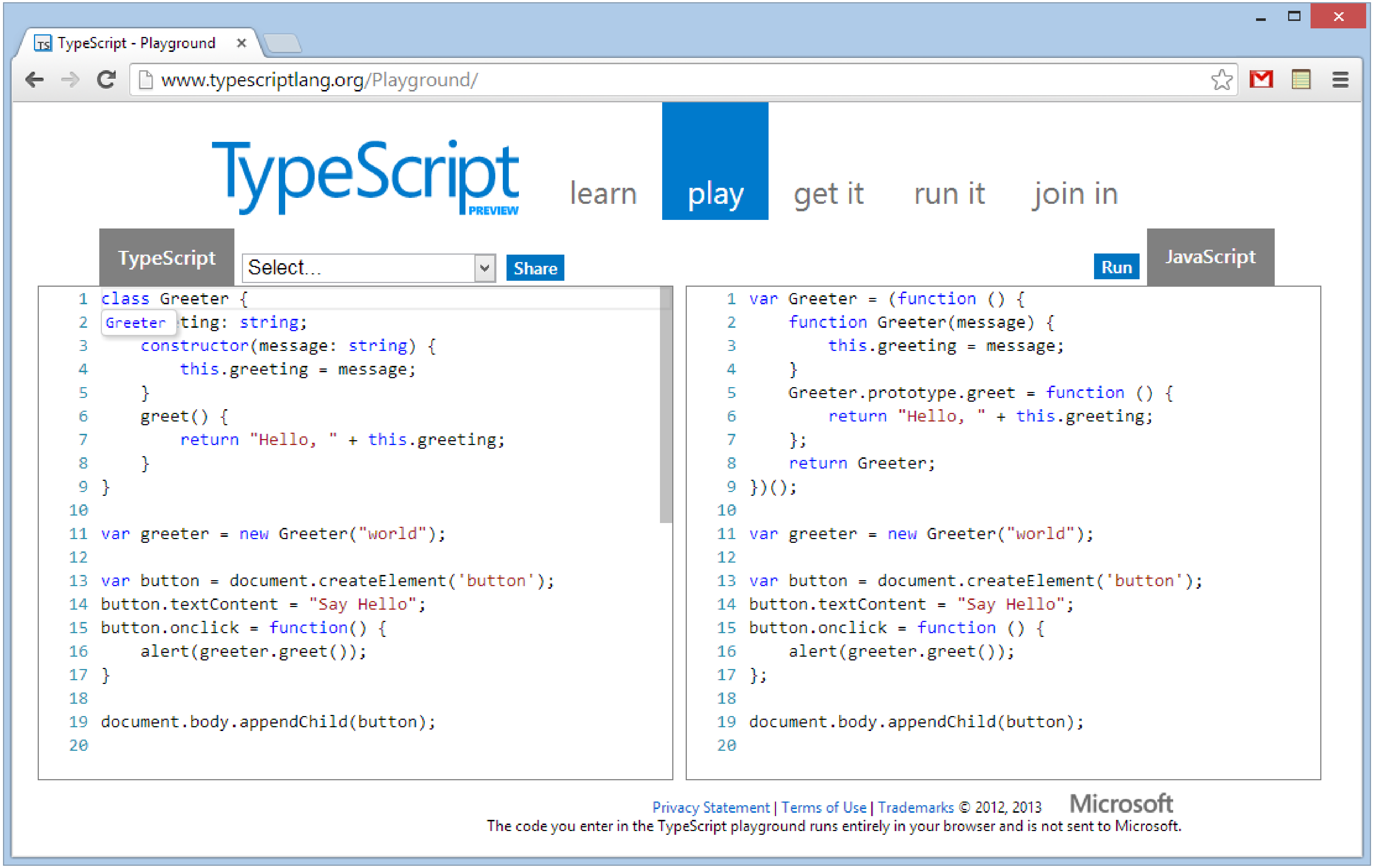
TypeScript

- Superset of JavaScript
- Adds type rules, classes
- Language defined in free TypeScript book (pdf)
  - http://www.typescriptlang.org/Content/TypeScript%20Language%20Specification.pdf
- Compiler compiles TypeScript to JavaScript
  - Compiler / type checker finds many bugs that may otherwise slip into production code
- Compiler is available as open-source
  - TypeScript compiler is implemented in TypeScript
  - http://typescript.codeplex.com/sourcecontrol/latest#README.txt

TypeScript IDE

- Visual Studio plugin:
  - UTA students may have access to Visual Studio Professional Edition via MSDNAA / DreamSpark
  - TypeScript plugin should also work in free edition
  - http://www.typescriptlang.org/#Download
- Simple web-based compiler to try out language:
  - http://www.typescriptlang.org/Playground/

Web-based TypeScript Compiler



```
class Greeter {
Greeter ting: string;
    constructor(message: string) {
        this.greeting = message;
    }
    greet() {
        return "Hello, " + this.greeting;
    }
}

var greeter = new Greeter("world");

var button = document.createElement('button');
button.textContent = "Say Hello";
button.onclick = function() {
    alert(greeter.greet());
}

document.body.appendChild(button);
```

```
var Greeter = (function () {
    function Greeter(message) {
        this.greeting = message;
    }
    Greeter.prototype.greet = function () {
        return "Hello, " + this.greeting;
    };
    return Greeter;
})();

var greeter = new Greeter("world");

var button = document.createElement('button');
button.textContent = "Say Hello";
button.onclick = function () {
    alert(greeter.greet());
};

document.body.appendChild(button);
```

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The code you enter in the TypeScript playground runs entirely in your browser and is not sent to Microsoft.

Random test application generator

PROJECT IDEA 2

Random Test Application Generator

- Generate valid applications of arbitrary size
  - For example: Generate a C# application with 1 million lines of code
- Useful to test tools that take programs as input
  - Compilers
  - Automatic bug finding tools
  - Automatic test case generation tools
  - Other program analysis tools
- Should be configurable
  - Size of generated application
  - Which language features used in generated application
  - Which external dependencies generated application has

Example: The RugRat Generator

- Generates random Java programs
- Available as open source software:
  - http://www.rugrat.ws/
- Only works for Java
- Restricted in the language features it can generate
  - For example: All parameters are integers

Random Test Application Generator

- Can be implemented in any language
  - Browser-based would be nice
- Target one or more of C#, Java, TypeScript, JavaScript, etc.

Natural language processing system to reproduce bug reports

PROJECT IDEA 3

NLP to Reproduce Bug Reports

- Many bad bug reports
- Can we throw an existing natural language processing (NLP) system at the problem?
- NLP system should try to understand bug report
  - Reproduce bug
  - Capture steps to reproduce bug and export as make file, Ant script, or similar
- Only accept bug report if NLP system can reproduce it

Your project idea

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Your Project Idea

- Should be new and exciting
  - New: Cannot be identical to existing software
  - Exciting: Some aspect should be interesting
  - New and exciting aspects should overlap
- Ideally a software engineering tool
  - Tool for software project management even better
- You can pick your implementation language
  - But mobile or web (+ possibly corresponding server components) would be best
- No violence
- Fully family friendly