school of | Computer Science & Statistics

# GUI Support for U·(TP)²

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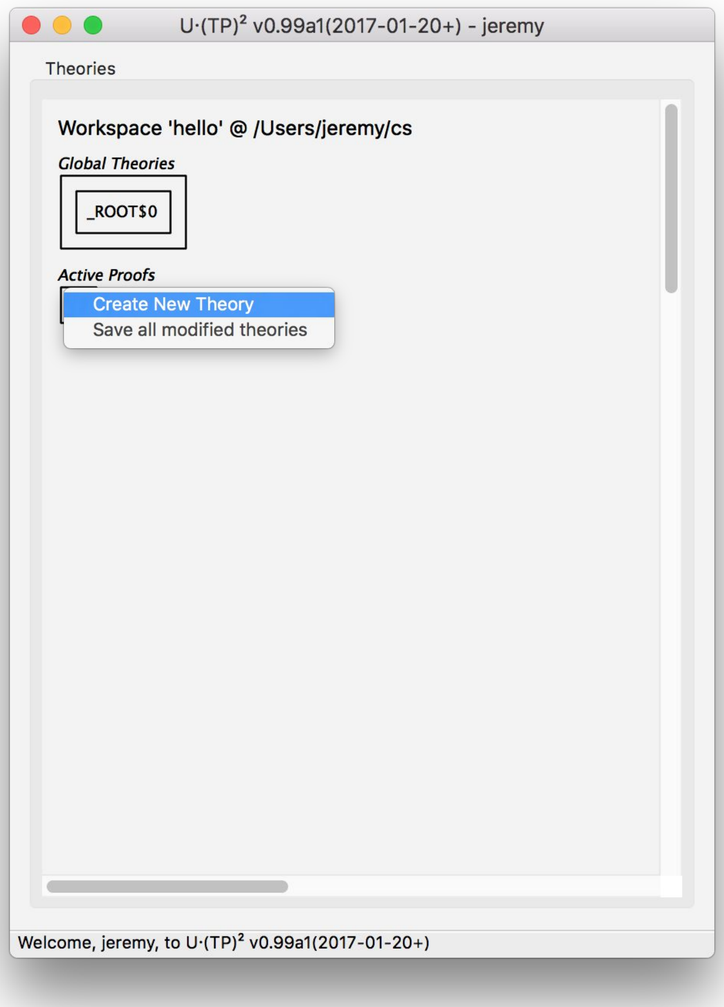



## U·(TP)²

Desktop application written by Dr. Andrew Butterfield.

Theorem Proving Assistant for the Unifying Theory of Programming.

Written in Haskell using an industrial strength GUI library named WxHaskell.

## WxHaskell

Wrapper around C++ GUI library named WxWidgets.

Difficult to install and to create OS native application bundles.

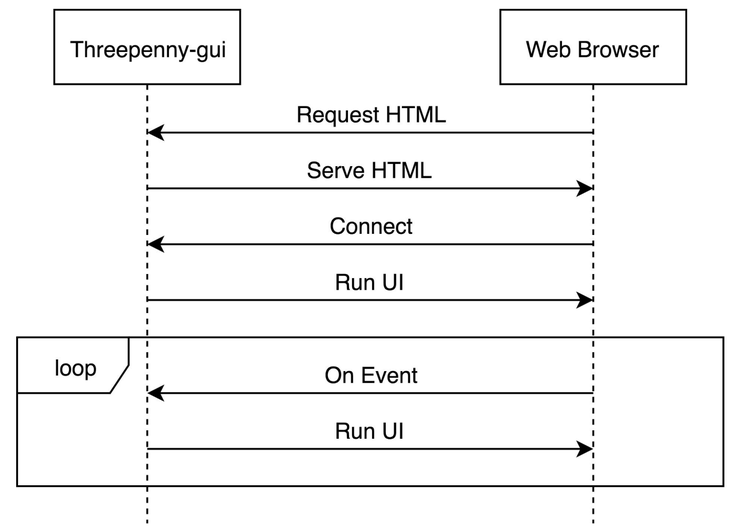
Exposes object oriented concepts of the wrapped C++ library.

## Threepenny-gui

Young Haskell GUI library that uses the web browser as a display.

Easy to install and gentle learning curve if you know HTML and JavaScript.

Created to explore the application of Functional Reactive Programming to building a GUI.

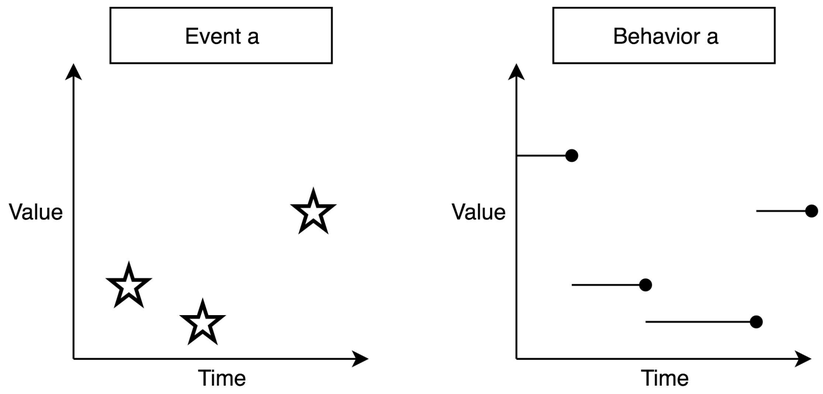



**Lifecycle Of A Threepenny-gui Application**

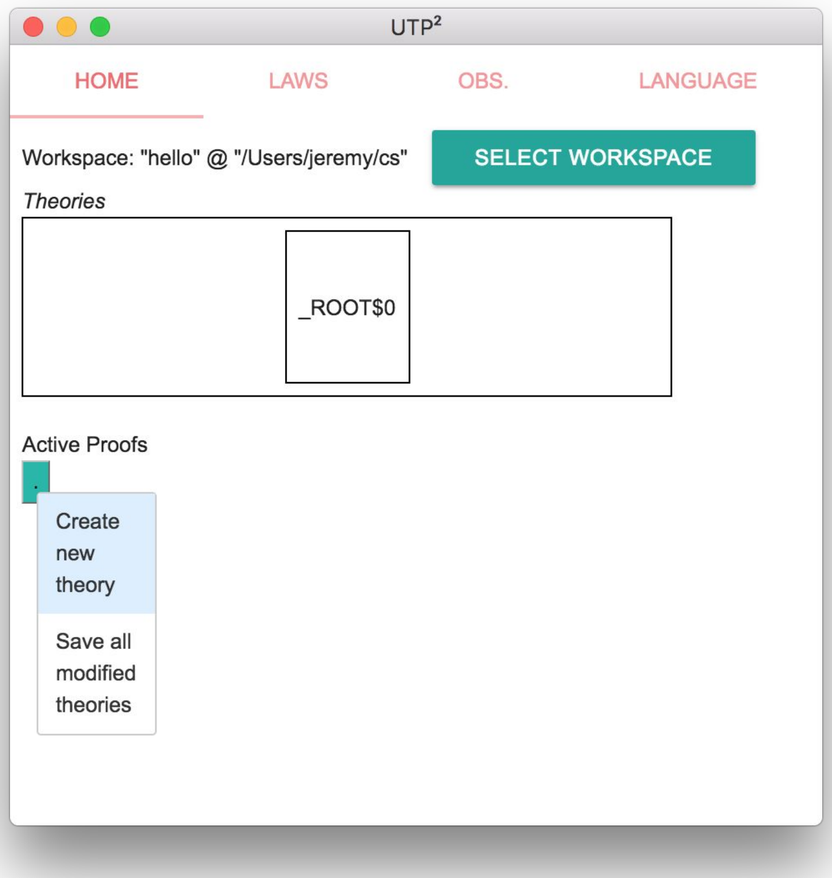
## Functional Reactive Programming (FRP)

Programming in the functional reactive style means to specify the dynamic behavior of a value V completely at the point of declaration. [1]

In contrast to the imperative style where we need to write explicit updates to the value V, this "action at a distance" is not visible at the point of declaration. [1]




**Datatypes Modelling Dynamic Values In FRP**




## U·(TP)² in Threepenny-gui

Exploration of Threepenny-gui's potential in building a GUI.

Threepenny-gui exposes the full power of modern web development.
Used MaterializeCSS for components like tabs and buttons.

Threepenny-gui limitations addressed: no right-click menus, poor layout combinators, no file or directory selection, and no creating OS native application bundles.

While Threepenny-gui lacks features, small codebase makes it easy to get involved, and means Threepenny-gui is very maintainable.

Difficult to integrate Threepenny-gui code with existing WxHaskell code in U·(TP)² due to conflicting architectures. WxHaskell allows for synchronous user interactions, while Threepenny-gui runs in JavaScript's event-driven environment.

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## B.A. (Mod.) Computer Science

**References:**

[1] https://github.com/HeinrichApfelmus/threepenny-gui/blob/master/doc/design-widgets.md