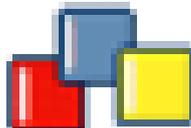




&

 **Haskell**

Jaak Ristioja
Tartu 2009

Gtk2Hs

- Arenduses vähemalt aastast 1999
- Ehitatud GTK+ (The Gimp Toolkit) baasil
 - Keeles C
 - LGPL
 - Arenduses alates 1997. aastast
 - X Window System, Microsoft Windows, MacOS X...

Gtk2Hs

- `initGUI`
- Blokeeruv `mainGUI` (event loop)
 - Callbacks
 - Kui töötlemine kaua, GUI hangub
 - Taimerid
- Keeruline hoida olekut
 - `IORef`, `Mvar`
- Lõimed aitavad

Gtk2Hs

- Automaatne mäluhaldus
- Glade (via XML)
- Vidinad
 - Tüübid
 - Aknad
 - Konteinerid
 - Vidinad
 - Luuakse IO monaadis:

```
window <- windowNew
```

Gtk2Hs

- Vidinate hierarhia tüüpide ja tüübiklassidega:

```
class WidgetClass w => ButtonClass w
data Button
instance WidgetClass Button
instance ButtonClass Button
```

- Enamus operatsioone kasutab tüübiklasse:

```
widgetShow :: WidgetClass w => w -> IO ()
```

Gtk2Hs

- Atribuutid kontrollivad vidinate välimust, olekut ja käitumist.

- Muutmine

```
set widget [ widgetAttr1 := foo,  
            widgetAttr2 :~ \x -> f x ]
```

- Lugemine

```
x <- get widget widgetAttr1
```

Gtk2Hs

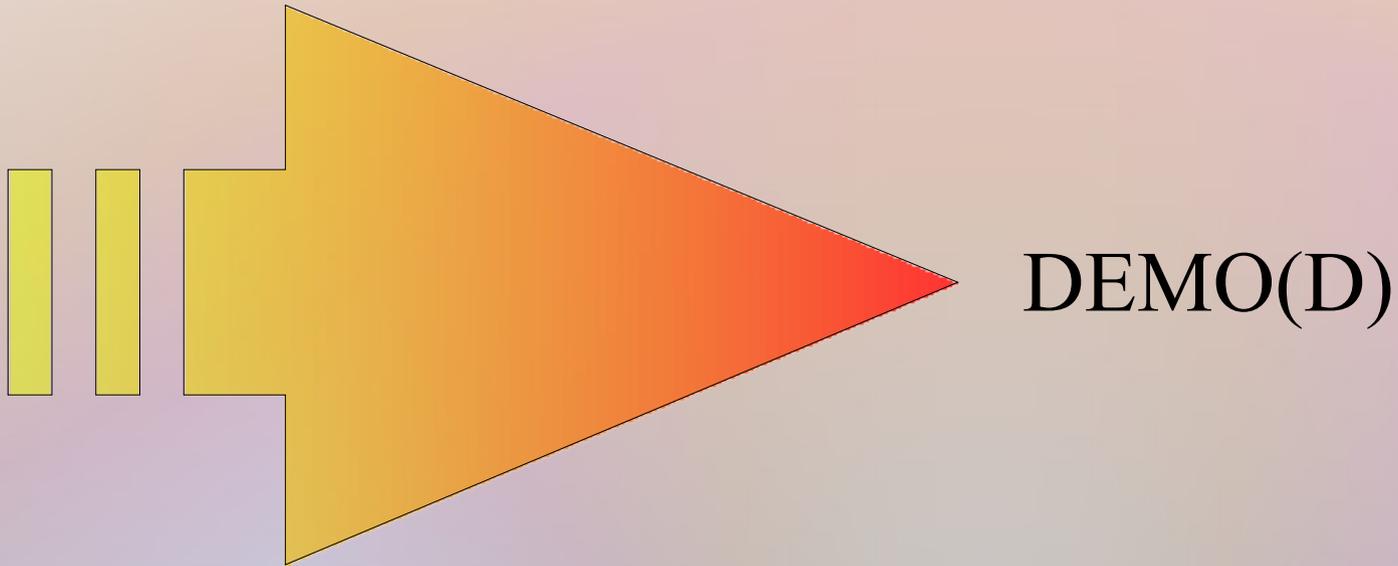
- Signaale saadetakse vidina olekute muutumisel või kasutaja sisendil
- Signaali vastuvõtvad sulundid on IO tüüpidega:

```
onClicked button $ do ...
```

- Mõned signaalid võtavad vastu parameetreid ja tagastavad väärtusi:

```
onExpose canvas $  
  \Expose { eventRegion = region } -> do  
  ...  
  return True
```

Hello World!



Gtk2Hs: Paigutus

- Pakitakse horisontaalsetesse või vertikaalsetesse kastidesse (box)
 - `hBoxNew` võrdselt Ruumi piksleidVahel
 - `boxPack*` box widget tüüp lisaruum
 - `boxPackStart` – ülevalt alla, vasakult paremale
 - `boxPackEnd` – alt üles, paremalt vasakule

```
-- hBoxNew :: Bool -> Int -> IO Hbox
hbox <- hBoxNew True 10
set window [containerBorderWidth := 10, containerChild := hbox]

-- boxPack* :: (WidgetClass child, BoxClass self) => self -> child -> Packing -> Int -> IO ()
boxPackStart hbox button1 PackGrow 0
boxPackStart hbox button2 PackGrow 0
```

Gtk2Hs: Paigutus

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```



DEMO

Gtk2Hs: Paigutus (2)

- Pakkimine tabelisse



```
-- tableNew :: Int -> Int -> Bool -> IO Table
--           ridu  veerge  homogenee
```

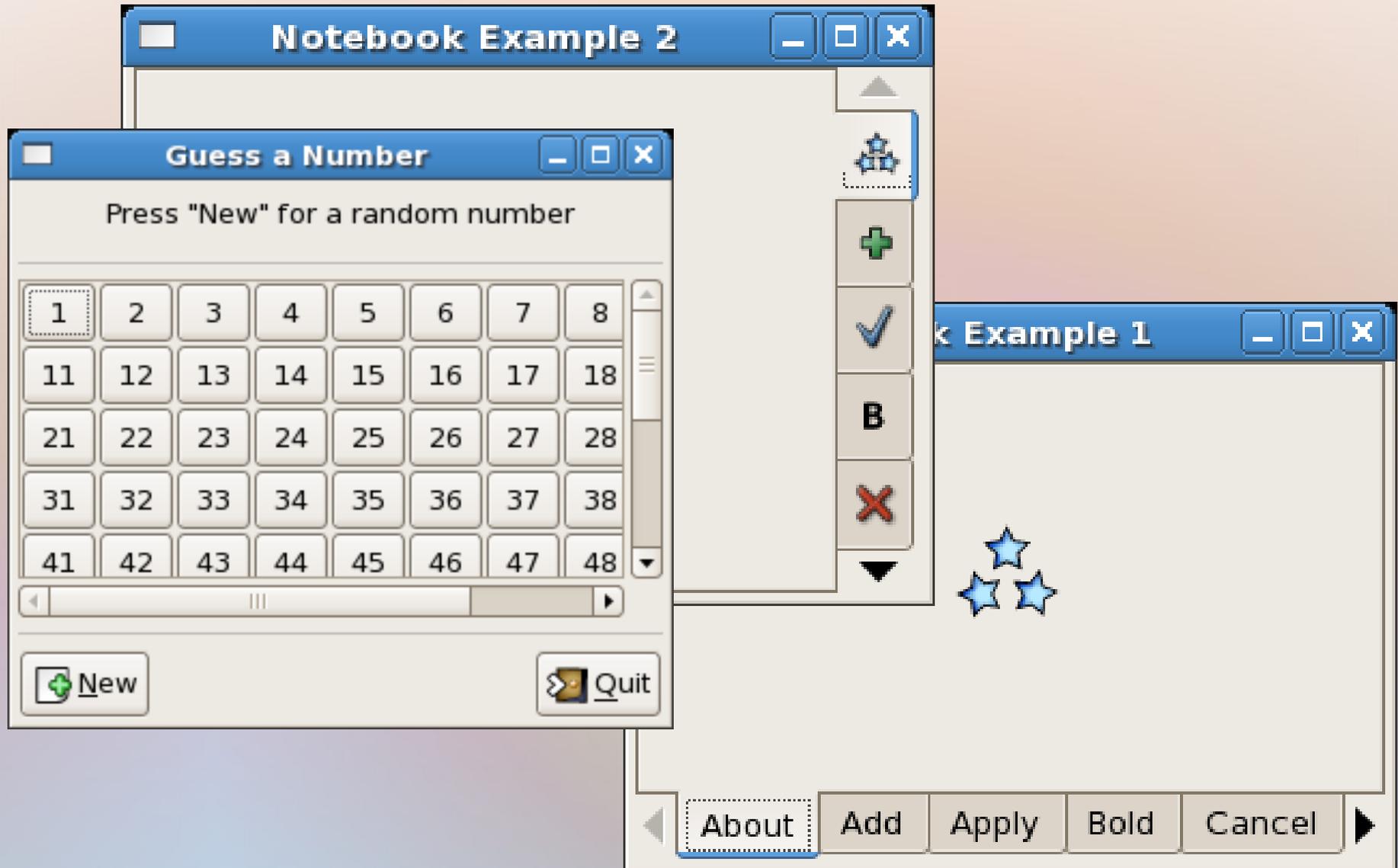
```
tabel <- tableNew 2 2 False
```

```
-- tableAttach :: (WidgetClass child, TableClass self) =>
--              self -> child -> Int -> Int -> Int -> Int
--              -> [AttachOptions] -> [AttachOptions]
--              -> Int -> Int -> IO ()
```

```
-- tabel, widget
-- vasak äär, parem äär, ülemine äär, alumine äär
-- (Expand, Shrink, Fill) hor. ja vert. Suurendamisel
-- hor. ja vert. ääris widgetile (0)
```

```
tableAttachDefaults tabel nupp 0 1 0 2
```

Gtk2Hs: Paigutus (3)



Gtk2Hs: Nupud

```
-- buttonNewWithLabel :: String -> IO Button
-- buttonNewWithMnemonic :: String -> IO Button
-- buttonNew :: IO Button
nupp <- buttonNew
containerAdd nupp sisu
```

Gtk2Hs: Nupud

```
-- buttonNewWithLabel :: String -> IO Button
-- buttonNewWithMnemonic :: String -> IO Button
-- buttonNew :: IO Button
nupp <- buttonNew
containerAdd nupp sisu
```



Gtk2Hs: Nupud (2)

- Signaalid
 - onPressed
 - onReleased
 - onClicked
 - onEnter
 - onLeave

Gtk2Hs: Nupud (3)

```
toggleButtonNew :: IO ToggleButton
toggleButtonNewWithLabel :: String -> IO Togglebutton
toggleButtonNewWithMnemonic :: String -> IO ToggleButton
toggleButtonGetActive :: ToggleButtonClass self => self
                                                                    -> IO Bool
toggleButtonSetActive :: ToggleButtonClass self => self
                                                                    -> Bool
                                                                    -> IO ()
```

- Sama checkBox puhul
- onToggled

Gtk2Hs: Nupud (4)

```
radioButtonNew :: IO RadioButton
```

```
radioButtonNewWithLabel :: String -> IO RadioButton
```

```
radioButtonNewWithMnemonic :: String -> IO RadioButton
```

```
radioButtonNewFromWidget :: RadioButton -> IO RadioButton
```

```
radioButtonNewWithLabelFromWidget :: RadioButton
```

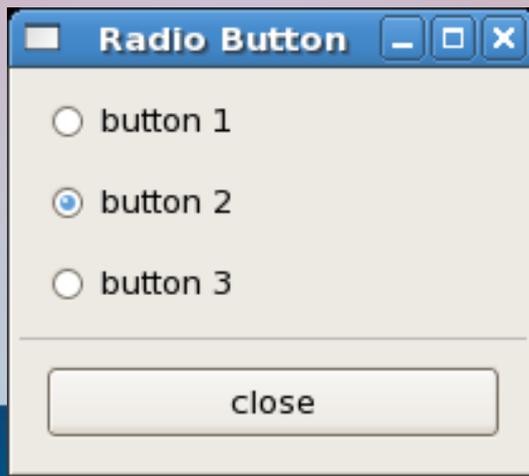
```
-> String
```

```
-> IO RadioButton
```

```
radioButtonNewWithMnemonicFromWidget :: RadioButton
```

```
-> String
```

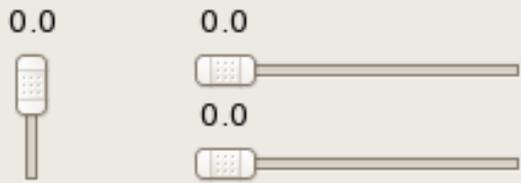
```
-> IO RadioButton
```



Gtk2Hs: Värke

Range Controls

0.0 0.0



Display Value on Scale Widgets

Scale Value Position: TOP

Scale Update Policy: Continuous

Scale Digits: 1

Scrollbar Page Size: 1

Spin Buttons

Simple SpinButtons

Day: 7 Month: 9 Year: 2007

More Features

Value: -31.7500 Decimal: 4

Snap to 0.25-ticks

Numeric only input mode

Wraparound at limits

Calendar

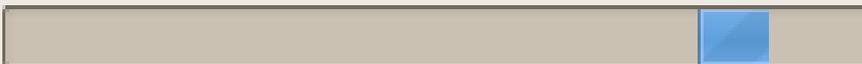
January 2008

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

Last Action: _____

Double Click
Date = 2008,

Time Flies



Apply Cancel Close

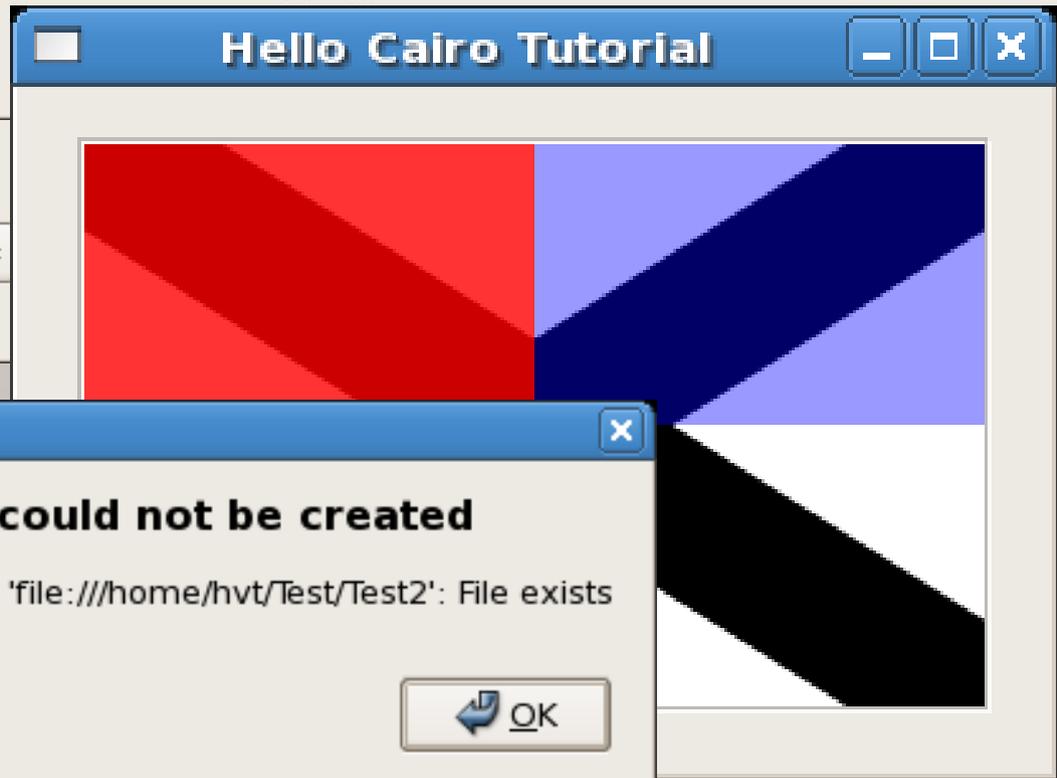
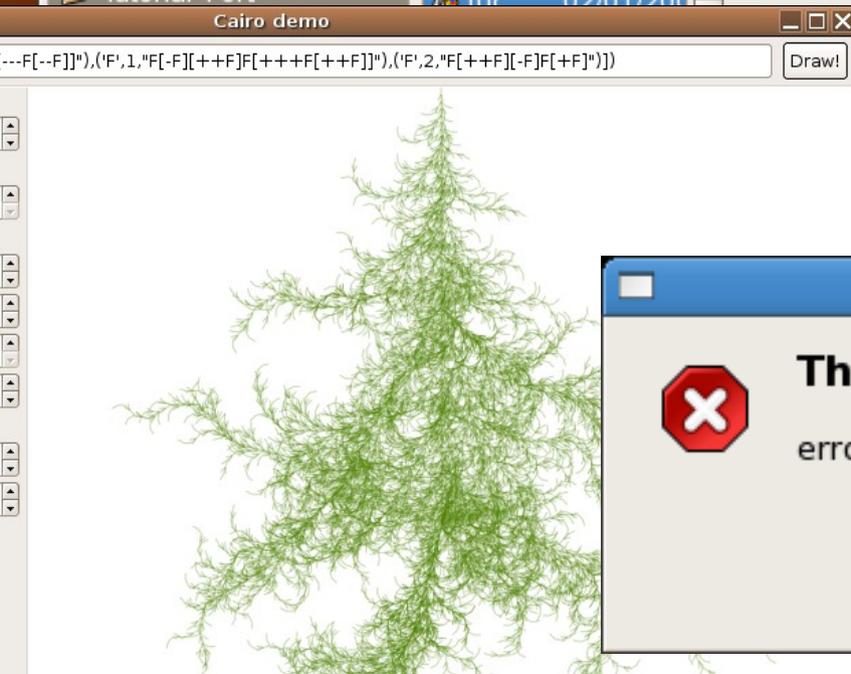
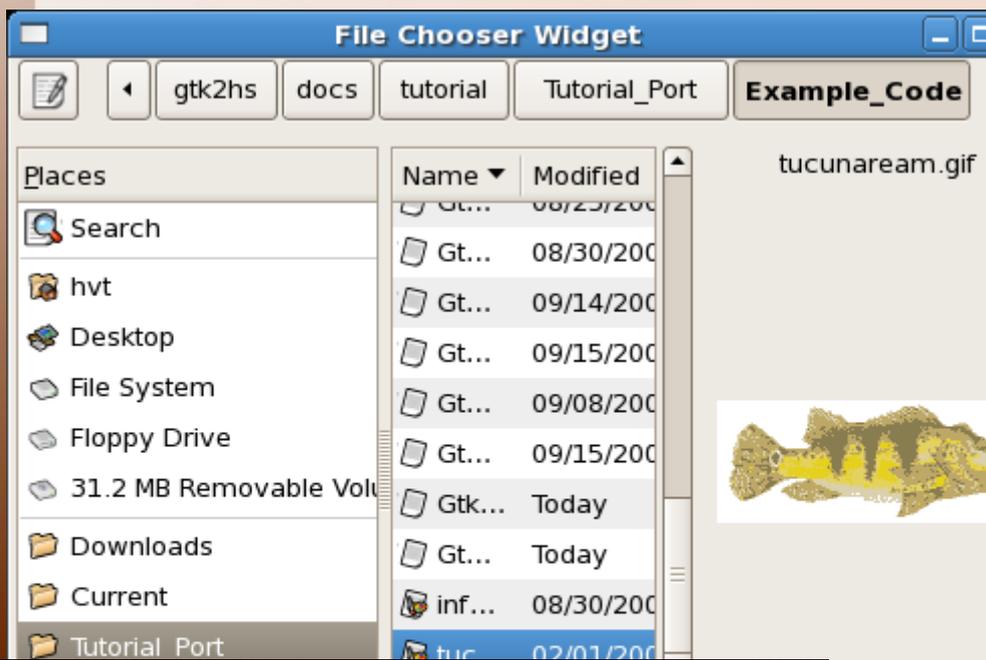
Text Entry

Anna

i Information

"Anna" is not equal to its reverse

Gtk2Hs: Veel vërke



Gtk2Hs

- Cairo (2D vektorgraafika + PS/PDF/PNG jne väljundid)
- Pango (Unicode'i renderdamine)
- Gnome' integratsioon (GConf jms)
- GStreamer
- SVG (laiendus Cairo'le)
- Mozilla HTML renderdamine vidinas
- „SourceView“ süntaksit värviv redaktorvidin
- jpm

wxHaskell

- Arenduses vähemalt aastast 2003
- Ehitatud wxWidgets (algne wxWindows) baasil
 - Keeles C++
 - WxWindows Library Licence
 - Põhimõtteliselt LGPL mõne erandiga
 - Siiski vaba tarkvara (OSI approved)
 - Arenduses alates 1992. aastast
 - X Window System, Microsoft Windows, MacOS X...
- WXCore – madalatasemeline (üks-ühele C++'ga)
- WX – kõrgetasemelised abstraktsioonid

wxHaskell

- Automaatne mäluhaldus
- Hierarhia probleem
 - Kõik konstruktorid võtavad argumendiks vanem-
elemendi
- Ei toeta hästi lõimi
- Käivitatakse IO () funktsioon

```
-- start :: IO a -> IO ()  
main = start hello  
hello :: IO ()  
hello = do  
    f <- frame [ text := "Hello!" ]
```

...

wxHaskell

- Vidinad (atribuudid sarnaselt Gtk2Hs)

```
f <- frame []
```

```
b <- button f [ attr1 := value ]
```

- Hierarhia

- Iga C++ klassi kohta fantoom-andmetüüp

```
data CWindow a
```

- Hierarhia

```
type Window a = Object (CWindow a)
```

- type Control a = Window (CControl a)

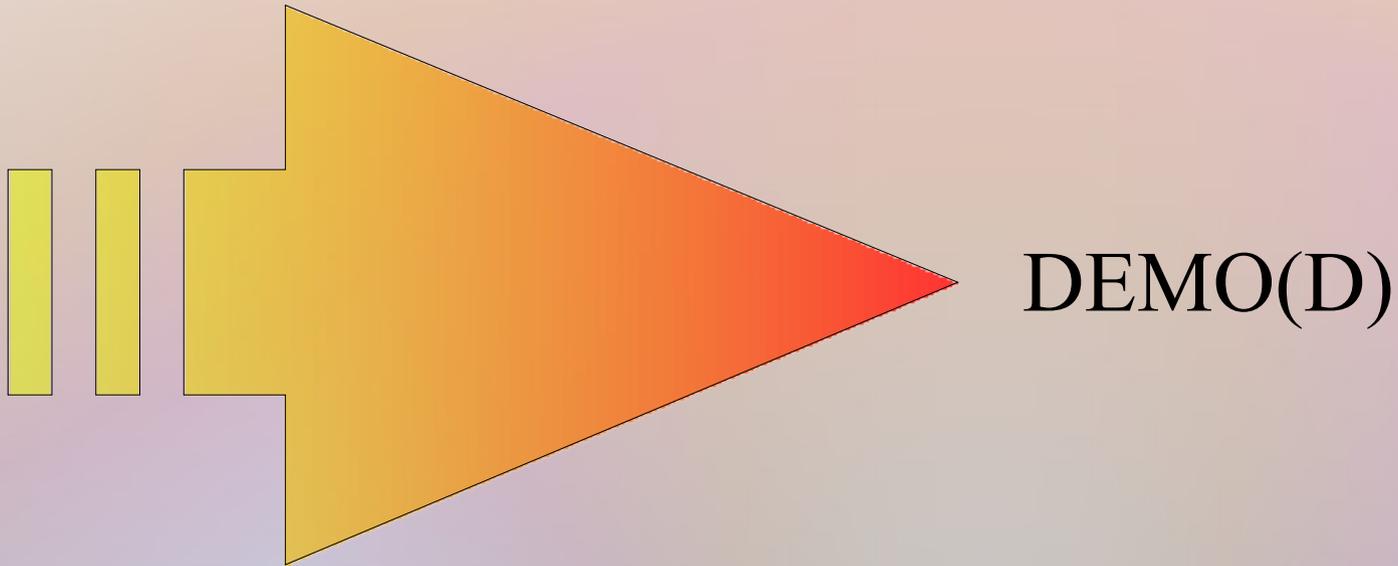
- type Button a = Control (CButton a)

wxHaskell

- Signaale saadetakse vidina olekute muutumisel või kasutaja sisendil
- Signaali vastuvõtvad sulundid on IO () tüübiga:

```
set button [ on command := mingivärk ]
-- on :: Event w a -> Attr w a
-- command :: (Commanding w) => Event w (IO ())
-- paint :: (Paint w) => Event w (
--             DC () -> Rect -> IO ()
--         )
```

Hello World!



wxHaskell: Paigutus

```
set f [ layout := margin 10 (column 5 [
    floatCentre (label "Hello"),
    floatCentre (widget quit)
]) ]
-- margin :: Int -> Layout -> Layout
-- floatCentre :: Layout -> Layout
-- row :: Int -> [Layout] -> Layout
-- widget :: (Widget w) => w -> Layout
-- label :: String -> Layout
-- hfill :: Layout -> Layout
-- hrule :: Int -> Layout
-- glue :: Layout
-- floatBottomRight :: Layout -> Layout
```



wxHaskell: Värke

The screenshot displays a wxHaskell application with several windows and components:

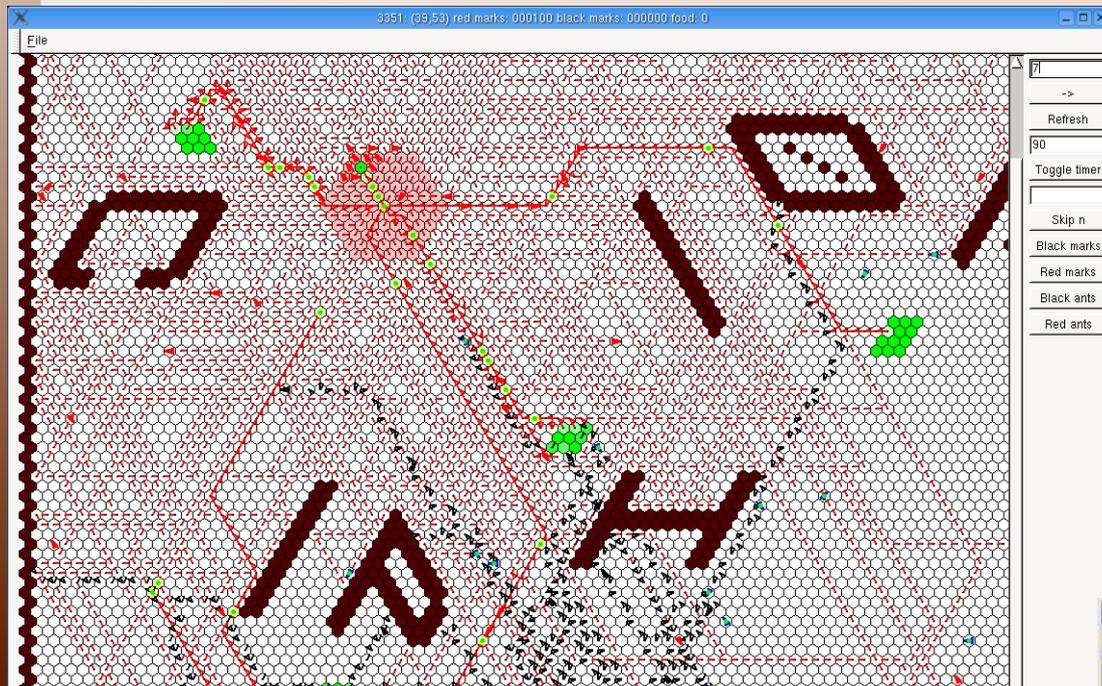
- File browser:** A window showing a file system tree with folders like 'dev', 'home', 'karina', and 'daan'. A list of files is shown on the right, including 'TimeFlowsEx.o', 'hello', 'Process.o', 'ImageViewer.hs', 'process', 'helloworld', 'Paint.hs', 'TimeFlows.hs', 'TimeFlowsEx.hs', 'FileBrowse.hs', and '#TimeFlowsEx...'. The 'FileBrowse.hs' file is highlighted.
- Control panel:** A window with tabs for 'buttons', 'radio box', and 'checkbox'. It contains a 'disable' button, a 'radio box' with three options ('first', 'second', 'third'), and a 'checkbox'.
- Grid test:** A window with a table containing names and a text area with logging information.
- Time flows like a river:** A window displaying a diagram of a river with the text 'like a river' and 'flows'.
- Image Viewer:** A window displaying an image of a sunset or sunrise over a body of water.

	First Name	Last Name
1	Daniel	Leijen
2	Arjan	
3	Martijn	
4	Andre	

logging enabled
keyEnter
cell changed: (0,0)

like a river
flows river
Time

wxHaskell: Veel värke



```
File
Document focus PathID (2.1.1.1.0) :: Int -> Int
module Main where

q :: Int == No value
q = case 3*7 of aaa -> 2+4; b -> 10;

h :: [(Int, Bool)] == Values: [(1, False), (2, True), (3, False)]
h = [(1, False), (2, True), (3, False)];

x :: Int == Value: 19 (auto layout)
x = let local = 1 + 2 + 3 + 4 + hr;
      n = 1;
      in if True
         then imo 10
         else 0;

imo :: Int -> Int
imo = \x -> x+1;

test :: Int == 5
test = 1 3;

f :: Int -> Int == Values: <function>
f = (3+)**(2+)*+10 = 10;

```

Jump to declaration of "imo"

Collaps e

Disable Auto Layout

copy

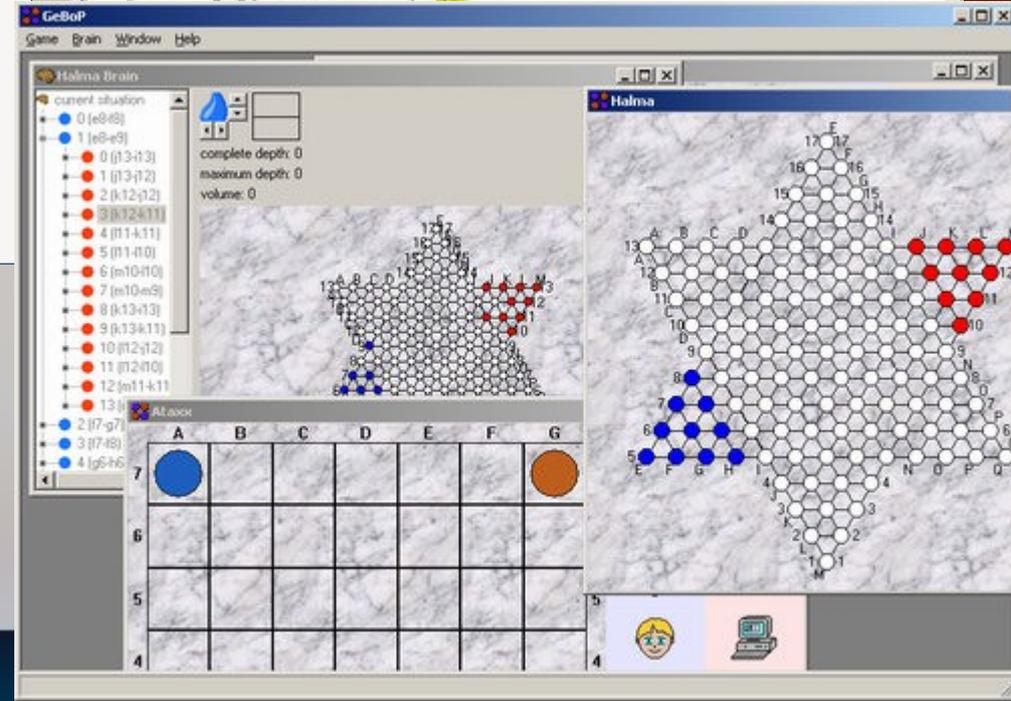
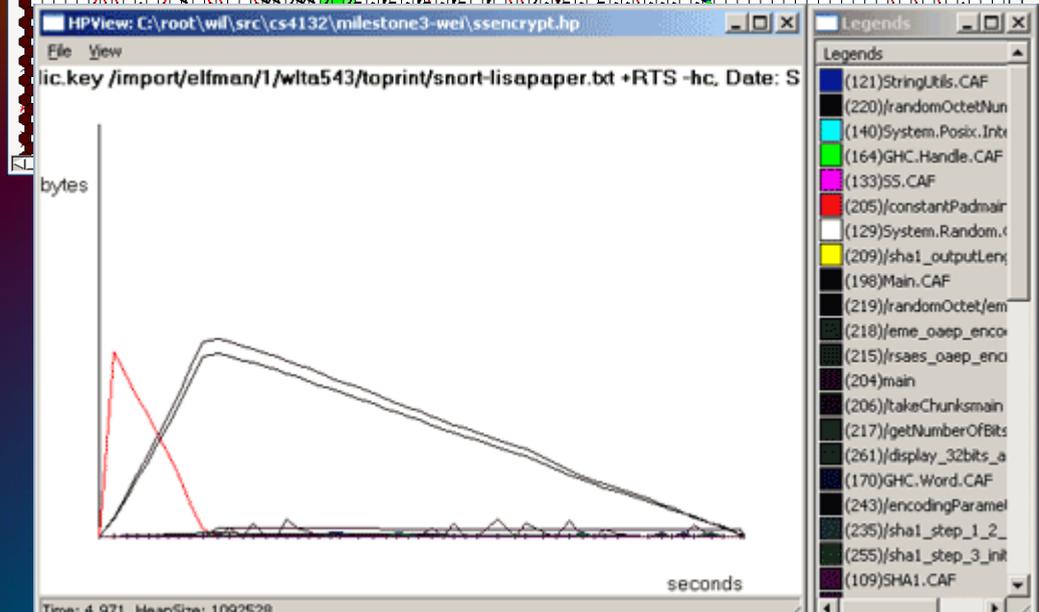
copy

paste

select

Ident String

Ident



Küsimusi?

LÖPP



TÄNAN
KUULAMAST!