Cloud4all and GPII: Anywhere Accessibility through Cloud-Based Auto-Personalisation

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Javier Hernández (Emergya)
Enable accessibility by:

- adapting software to fit the user's needs
  - operating system settings: Windows, Linux GNOME, Android
  - assistive technology (AT) settings: Orca, on-screen keyboard, ...
  - browsers and web applications: Firefox, ...
  - third-party apps, e.g. Mobile Accessibility for Android (Code Factory)
GPII Goals (2)

- Delivering AT that fits the user's needs
- Finding alternative versions of content
  - e.g. captioned versions of video
- Adapting embedded systems
  - Ticket vending machines, DTV
"Global Public Inclusive Infrastructure"

- We don't build new AT
- AT and other software
  - gets adapted to connect to GPII
  - can then adapt to the user's settings
- We build the framework to enable this
Contributing Projects

- Led by Raising the Floor International
  - Started by Prof. Gregg Vanderheiden
- Cloud4all (EU-funded, Nov 2011 – Oct 2015)
  - 24 partners, including Trace Center (Wisconsin, US) & IDRC (Toronto, Ca)
- Prosperity4All (EU-funded, Jan 2014 – Jan 2018)
- Fluid & FLOE (Canada)
- Research to Reality (US)
- Preferences for Global Access (US DoE)
- UIITA-RERC (US)
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Demo: Adaptations on GNOME

- A set of preferences is created on Windows
- User moves to GNU/Linux with GNOME
- Preferences are used to adapt GNOME

Sammy (magnification & font scaling):
  - http://localhost:8081/user/sammy/login
  - http://localhost:8081/user/sammy/logout

Timothy (high contrast):
  - http://localhost:8081/user/timothy_bw/login
  - http://localhost:8081/user/timothy_bw/logout
GPII on Android

- Using Anode: Android port of Node.js
- Customising settings is harder
- Requires rooted phone!
- Support includes:
  - Settings system API, e.g. font size
  - Launch applications, TalkBack screenreader
- Good NFC support for “logging” in & out
- Sensors for context-based adaptation
User Listeners

• user presents a "key"
  – using a USB drive
  – using an NFC tag (➡ demo at our booth)
  – typing a special string on the keyboard
  – ...

• User Listener detects the key and sends it to the Flow Manager
Preferences

• Flow Manager fetches preferences from Preference Server

• Format = JSON

(...} {

"http://registry.gpii.net/common/language": "en",
"http://registry.gpii.net/common/speechRate": 180,
"http://registry.gpii.net/common/keyEcho": false",
"http://registry.gpii.net/common/wordEcho": true,
"http://registry.gpii.net/common/punctuationVerbosity": "all"

}) (...)
{  
  "flat": {  
    "contexts": {  
      "gpii-default": {  
        "name": "Default preferences",  
        "preferences": { "http://registry.gpii.net/common/fontSize": 12 }  
      },  
      "really-bright": {  
        "name": "Really bright out",  
        "preferences": { "http://registry.gpii.net/common/fontSize": 16 },  
        "conditions": [{  
          "type": "http://registry.gpii.net/conditions/inRange",  
          "min": 700,  
          "inputPath": "http://registry\.gpii\.net/common/environment/illuminance"  
        }]  
      }  
    }  
  }  
}
• The device tells the Flow Manager
  - what operating system it is running
  - what assistive technologies are available
  - "context information" (ambient light, ambient noise)
    • -> automatically adapt contrast depending on light
    • -> automatically increase sound or switch on captions depending on noise
    • on Android with built-in sensors
    • on PCs through Context-Aware Server
• Flow Manager sends preferences and device info to the Matchmaker
• Matchmaker infers settings for "new" OS or software
• Matchmaker consults Solutions Registry for info on assistive technologies etc.
Launching and Stopping Solutions

- Flow Manager sends settings to Lifecycle Manager
- Snapshot of current settings
- Set each application's settings
- Launch application(s)

- When user "logs out", restore original settings
Multi-Level Adaptation

• Combine adaptations on up to 5 levels:
  - OS
  - Assistive technologies on the OS
  - Browser's accessibility features
  - Web-based AT
  - Web app's accessibility features

• E.g. because browser/web content does not inherit OS contrast settings
How to Integrate with GPII?

You don't need to do much!!

- Define the **settings** of your *solution*
- Where and how they are stored
- How your solution can be launched and stopped
How to Integrate with GPII?

• Define the **settings** of your *solution*
  - Name, data type, value range, default value, possibly relationship with other settings
  - e.g. *invert-lightness* (Boolean; default *false*) in GNOMEShell Magnifier

• Define an **ID** for your solution
  - e.g. `org.gnome.desktop.a11y.magnifier`
"settingsHandlers": [
{
  "type": "gpii.gsettings",
  "options": {
    "schema": "org.gnome.desktop.a11y.magnifier"
  },
  "capabilities": [
    "applications.org\ gnome\ desktop\ a11y\ magnifier.id"
  ],
  "capabilitiesTransformations": {
    "mag-factor": "http://registry\ gpii\ net/common/magnification",
    "show-cross-hairs": "http://registry\ gpii\ net/common/showCrosshairs",
    "transform": {
      "type": "fluid.transforms.arrayToSetMembership",
      "inputPath": "http://registry\ gpii\ net/common/tracking",
      "presentValue": "proportional",
      "missingValue": "none",
      "options": {
        "focus": "focus-tracking",
        "caret": "caret-tracking",
        "mouse": "mouse-tracking"
      }
    }
  }
},
]
"lifecycleManager": {
    "start": [
        "setSettings",
        {
            "type": "gpii.launch.exec",
            "command": "gsettings set org.gnome.desktop.a11y.applications screen-magnifier-enabled true"
        }
    ],
    "stop": [
        {
            "type": "gpii.launch.exec",
            "command": "gsettings set org.gnome.desktop.a11y.applications screen-magnifier-enabled false"
        },
        "restoreSettings"
    ]
}
• Project: www.cloud4all.info
• GPII & contributing projects: www.gpii.net
Have a Look at Our Work

Wiki: http://wiki.gpii.net/

Core (real-time) Framework v0.1 - Installation Instructions

This release supports two platforms: Windows 7 and Fedora Linux with Gnome 3. Installation instructions can be found below.

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      1.2.2 Install node
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      1.2.4 Install and run GPII Personalization Framework
      1.2.5 Running the framework in general

2 Windows Installation Instructions
   2.1 Dependencies
   2.2 Building and Starting
   2.3 Setup and Configuration
   2.4 RFID Listener
Want to Contribute?

Fork our code: http://github.com/GPII