REVEAL: Software Documentation and Platform Migration

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USRP Interns – Summer 2008
Outline

• Background
• Internship Objectives
• Project Foundation
• Platform Migration
• Field Test
• Next Steps
• Project Status
• Research Environment for Vehicle-Embedded Analysis on Linux

• Implemented on MontaVista Linux

• “Data acquisition and distribution system”

• Primarily used in aircraft
Suborbital Telepresence

- Hardware platform for REVEAL
- PC/104 Form Factor
- Configurable acquisition, processing, recording
Internship Objectives

• Grow REVEAL’s support for multiple developers
  • modern version control system
  • modern software documentation

• Verify implementation flexibility
  • implement on different CPUs
  • demonstrate end-to-end functionality
Project Foundation: Subversion

• Version Control Software
• Motivation
  – Multiple people working with same files
ViewVC

Index of /

Files shown: 14
Directory revision: 77 (of 77)
Sticky Revision:  

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Site Admin
Powered by ViewVC 1.0.5
### ViewVC

**Highlighted differences**

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<td>REVEAL = /Users/mjm/Reveal</td>
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<td>LDADS = $(REVEAL)/Revealv1.1a</td>
<td>OBJ = $(REVEAL)/lib</td>
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<td>OBJ = $(LDADS)/LIB</td>
<td>BIN = $(REVEAL)/bin</td>
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<td>BIN = $(LDADS)/BIN</td>
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Doxygen

• Visual Interactive Code Documentation
• Motivation
  – Easy to find and interpret code
  – Parses files, functions, variables, definitions
  – Useful comment structure
Validates ARINC-429 parity

**FUNCTIONAL DESCRIPTION:**
The Condor card has already checked parity and set a bit in the 32-bit parameter word to let us know, we just look at the bit.

**REVISION HISTORY:**
11/24/04 Carl Sorenson Created
01/31/08 Carl Sorenson From 2 to 4 channels

**NOTES:**
If the channel is in "raw mode" parity is not checked by card or us.

```c
int checkParity(int chan, uint32_t word)
{
  if (word & ARINC_PARITY_BIT) okay = TRUE; break;
  default: jobMsg(LOG_BUG, "checkParity: invalid channel: %s", chan);
}
```
Doxygen - GraphViz

- File dependency graphs
- Clickable links
Doxygen – GraphViz (cont.)

- Functional dependency graphs
- Flow visualization
- Easy code debugging
Platform Migration

- Three considered platforms:
  - VersaLogic EPM-5 “Puma”
  - Lippert “Cool FrontRunner”
  - eBox-2300 ("NorhTec MicroClient")

- Puma and Lippert suspended due to time constraints
• Motivations for choice
  – Built-in Compact Flash interface
  – Passive Cooling
  – Low Power Consumption (15W)
  – Self Contained
  – Two Serial Ports
eBox-2300 (cont.)

- Finally: small size
eBox Modification

- Added 2\textsuperscript{nd} Compact Flash interface
  - Usability: separates system and data
  - Makes one complete package
Testing REVEAL

• Data Source: Piccolo II Autopilot
  • Generates useful, verifiable data
  • Communicates over serial
  • Existing data acquisition software
Testing REVEAL (cont.)

- Network Link: Iridium 9505A Satellite Phone
  - Globally accessible
  - Allows data transmission
  - Serial accessory
Field Test

• Proof of Concept

Truck Setup

Terminal
Field Test (cont.)
Next Steps

- Further documentation
  - XML configuration files
  - Data flow
  - Accessibility to a broader audience
- Further miniaturization of REVEAL hardware
  - Current size is restrictive
- Expanded applications of REVEAL software
Project Status

• Implemented multi-developer capability for REVEAL
  • Created interactive REVEAL documentation.

• Became first users

• Migrated REVEAL to low-cost hardware (eBox-2300)
  • Field tested system
  • Verified end-to-end operation
Acknowledgments

• Larry Freudinger
• Brent Bieber
• Sky Yarbrough
• Jim Murray
• Shari Olson
• Miriam Rodon-Naveira
• Matt Miller & John Wilson
• Professor Gary Gear
Questions?