



LLRF DOOCS
Server

A. Piotrowski

Server
modifications

Performance
evaluation

Server
improvements



Technical University of
Lodz, Poland
Department of
Microelectronics and
Computer Science

Server Development Status and Resource Overview

A. Piotrowski

Technical University of Lodz, Poland
Department of Microelectronics and Computer Science

February 20, 2013



Agenda

LLRF DOOCS
Server

A. Piotrowski

Server
modifications

Performance
evaluation

Server
improvements

1 Server modifications

2 Performance evaluation

3 Server improvements



Technical University of
Lodz, Poland
Department of
Microelectronics and
Computer Science



Last Server Updates

LLRF DOOCS
Server

A. Piotrowski

Server
modifications

Performance
evaluation

Server
improvements

Support for diagnostic for uTC and ADC boards

- PROBE, VFORW, VREFL limiters, prelimiters and ADC overflow monitoring (ADC boards only)
- PROBE, VFORW, VREFL PCIe, 81MHz and 200MHz clock monitoring
- PROBE, VFORW, VREFL triggers present indicators and estimated frequency



Technical University of
Lodz, Poland
Department of
Microelectronics and
Computer Science



Last Server Updates

LLRF DOOCS
Server

A. Piotrowski

Server
modifications

Performance
evaluation

Server
improvements



Technical University of
Lodz, Poland
Department of
Microelectronics and
Computer Science

Support for DAQ system

- implemented in servers for ACC1, ACC23, ACC67
- several problems detected:
 - unsupported functionality of event number generation in timer library
 - after last DOOCS library update all recompiled servers with enabled DAQ support crashing immediately after start
 - server with enabled DAQ functionality always hangs up during shutdown



Last Server Updates

LLRF DOOCS
Server

A. Piotrowski

Server
modifications

Performance
evaluation

Server
improvements

Locations/properties names changes

- Properties for all control components were moved to new location
- Names of locations and properties were adjusted to naming convention
- All LLRF control servers were moved to common address
FLASH.RF/LLRF.CONTROLLER
 - all properties available in one place
 - locations names too long to use `rpc_test` tool
 - locations names must be included into ENS configuration file



Technical University of
Lodz, Poland
Department of
Microelectronics and
Computer Science



Last Server Updates

LLRF DOOCS
Server

A. Piotrowski

Server
modifications

Performance
evaluation

Server
improvements

Minor changes

- plugin-based locations interface has been tested (useful for non time critical servers)
- new publisher-subscriber mechanism has been tested in EBPM system
- BLC implemented but not tested
- server has never crashed during long-term operation



Technical University of
Lodz, Poland
Department of
Microelectronics and
Computer Science



Last Server Updates

LLRF DOOCS

Server

A. Piotrowski

Server
modifications

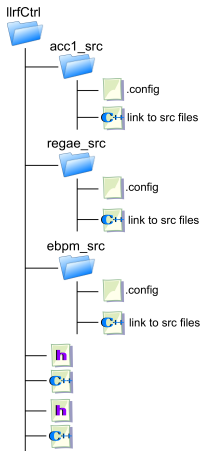
Performance
evaluation

Server
improvements



Technical University of
Lodz, Poland
Department of
Microelectronics and
Computer Science

New structure of source code directory



- new concept for source code directory structure
- source code folders composed of subproject configuration, links to source files, specialized version of Makefile



Last Server Updates

LLRF DOOCS

Server

A. Piotrowski

GUI-Based Source Code Configuration Tool

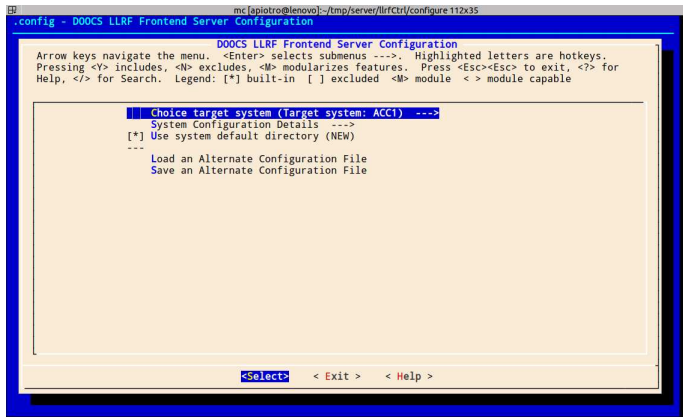
Server
modifications

Performance
evaluation

Server
improvements



Technical University of
Lodz, Poland
Department of
Microelectronics and
Computer Science





Last Server Updates

LLRF DOOCS

Server

A. Piotrowski

GUI-Based Source Code Configuration Tool

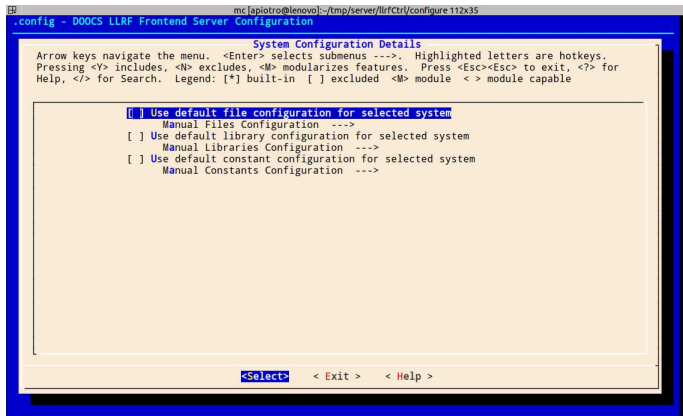
Server
modifications

Performance
evaluation

Server
improvements



Technical University of
Lodz, Poland
Department of
Microelectronics and
Computer Science





Last Server Updates

LLRF DOOCS

Server

A. Piotrowski

GUI-Based Source Code Configuration Tool

Server
modifications

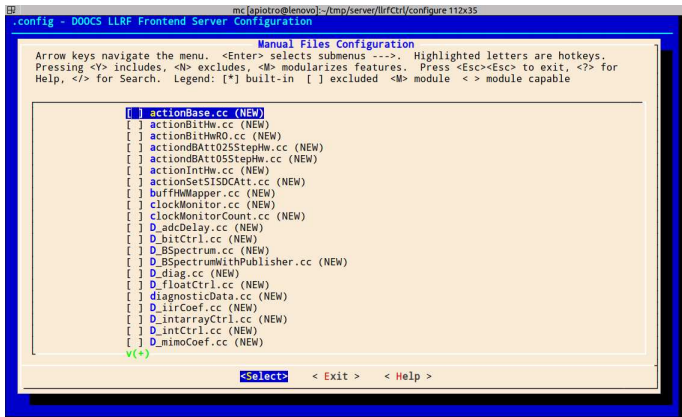
Performance
evaluation

Server
improvements



Technical University of
Lodz, Poland
Department of
Microelectronics and
Computer Science

10/18





Last Server Updates

LLRF DOOCS

Server

A. Piotrowski

Server
modifications

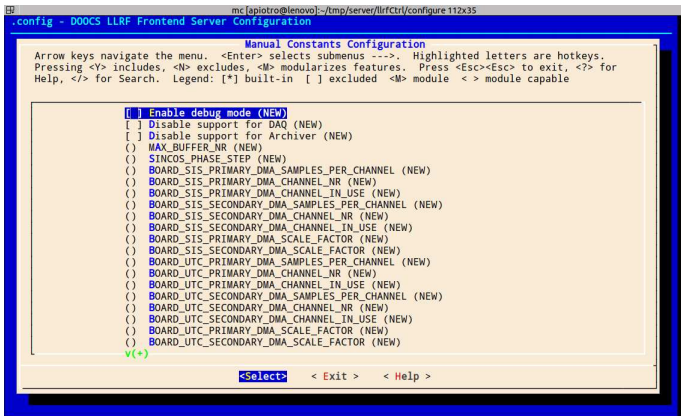
Performance
evaluation

Server
improvements



Technical University of
Lodz, Poland
Department of
Microelectronics and
Computer Science

GUI-Based Source Code Configuration Tool





Performance evaluation

LLRF DOOCS
Server

A. Piotrowski

Server
modifications

Performance
evaluation

Server
improvements



Technical University of
Lodz, Poland
Department of
Microelectronics and
Computer Science

CPU utilization $\sim 60\%$
PCIe throughput ~ 295 MB/s

	3 SIS	6 SIS
one board DMA readout	34 ms	34 ms
all boards DMA readout	35 ms	58 ms
rest of SIGUSR1 operations	15 ms	23 ms
total SIGUSR1 operation	50 ms	81 ms



Performance evaluation

LLRF DOOS
Server

A. Piotrowski

SIGUSR1 execution time on system with 3 SIS boards and
standard process priority



Technical University of
Lodz, Poland
Department of
Microelectronics and
Computer Science



Performance evaluation

LLRF DOOS
Server

A. Piotrowski

Server
modifications

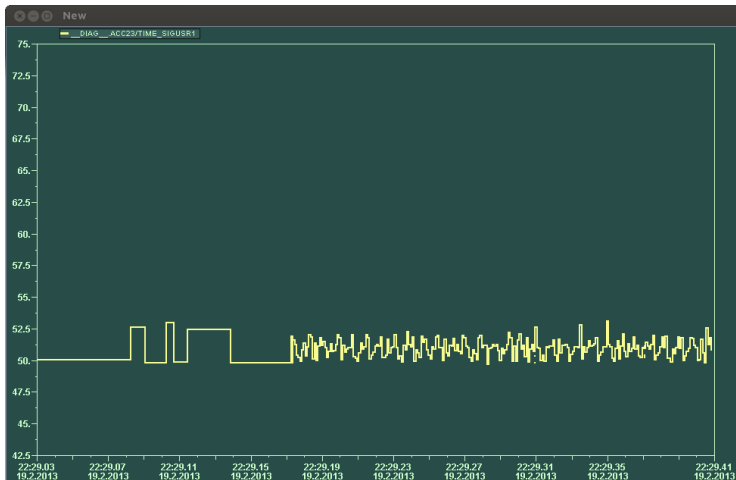
Performance
evaluation

Server
improvements



Technical University of
Lodz, Poland
Department of
Microelectronics and
Computer Science

SIGUSR1 execution time on system with 3 SIS boards and
real-time process priority





Performance evaluation

LLRF DOOCS
Server

A. Piotrowski

SIGUSR1 execution time on system with 6 SIS boards and
standard process priority

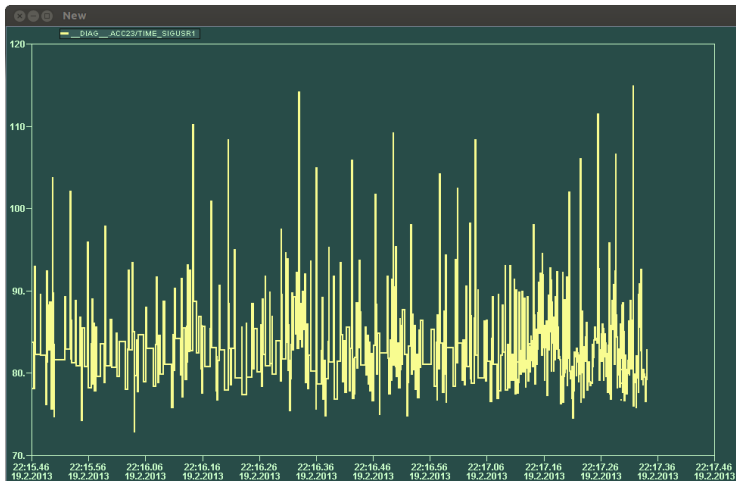
Server
modifications

Performance
evaluation

Server
improvements



Technical University of
Lodz, Poland
Department of
Microelectronics and
Computer Science





Performance evaluation

LLRF DOOS
Server

A. Piotrowski

SIGUSR1 execution time on system with 6 SIS boards and
real-time process priority

Server
modifications

Performance
evaluation

Server
improvements



Technical University of
Lodz, Poland
Department of
Microelectronics and
Computer Science





Improvements

LLRF DOOCS
Server

A. Piotrowski

Server
modifications

Performance
evaluation

Server
improvements



Technical University of
Lodz, Poland
Department of
Microelectronics and
Computer Science

Server side

- Optimization of spectrum buffer filling mechanism
- Move DOOCS tools and universal server components to dynamic libraries

Driver side

- Optimization of register access mechanism
- Optimization of DMA data readout
 - accessing user buffer from kernel
 - mmap - accessing kernel buffer from user space
 - copy data from kernel to user



LLRF DOOCS
Server

A. Piotrowski

Server
modifications

Performance
evaluation

Server
improvements



Technical University of
Lodz, Poland
Department of
Microelectronics and
Computer Science

Thank You