Technical Studentship overview

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Supervisor: Patricia Mendez Lorenzo

About me

Bachelor in Computer Science

Thesis: “System for recognition of cars on images”

Master in Computer Science (1 year remaining)

Thesis: “Implementation of quality control system for triggering alarms in the ALICE O2”

AGH University of Science and Technology in Cracow

Work in SFT

- LCG operations
- LCGTest
- Maintenance of the build machines (cc7 and slc6)
- Introducing new puppet configuration
- Compiler compilations with LCGCMake
- Documentation
- Photoelectric effect with machine learning

LCG operations

- Adding and updating packages
  Packages upgraded/added in dev3: 80 (estimation)
  Packages added to LCG stack: 40 (estimation)
- Fixing discovered bugs
- Improving LCG build infrastructure
- Ensuring success of nightly builds
- Introducing new compiles and platforms (gcc8, clang6, ubuntu18)

Git statistics

LCGCMake

Commits: 282
Lines added: 3988
Lines removed: 2306

LCGjenkins

Commits: 66 (+50)
Lines added: 1597 (+894)
Lines removed: 418 (+32)

it-puppet-hostgroup-lcgapp

Commits: 86
Lines added: 2093
Lines removed: 1016

LCG release in docker

- Implementation of packing release or part of release in one tarball
  - Packing release for clients with restricted network (BE department)
- Creating infrastructure to release a docker image
- Creating docker images with LCG release (LCG 93)

LCGTest

- Creating generic python module tests
- Creating binary execution test (not active)

- Attaching execution of the script to nightly builds
- Post-installation test
    - Sourcing view from cvmfs

Compilers

- Compile compilers with LCGCmake
  - Creates dependencies
  - Creates tarball reused in other parts of LCG
- Creating RPMs from tarball
- Introducing dependency aware setup.{sh,csh} files
  - Very sorry for broken builds!
- Compiler contains hash
  - Introducing change to compiler will force to create new hash
  - Changing dependency (e.g. binutils) will change the hash

Puppet

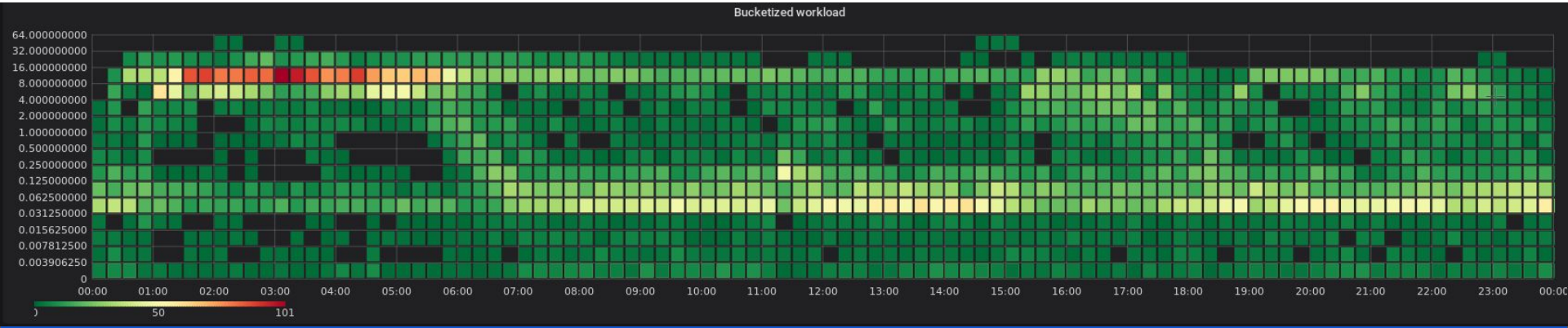
- Taking full advantage of hierarchical model in puppet
  - lcgapp/x86_64/build/cc7/docker
  - lcgapp/x86_64/service/web/cdash
  - lcgapp/i386/build
- Modules to encapsulate common functionality
  - statistics
  - credentials
  - mounting
- Create ready to attache machine to jenkins
  - Currently it requires only a machine reboot after puppet config applied

More puppet

- Staying consistent with changes
  - Incompatible eosclient for 32bit: init.pp -> x86_64.pp
  - Introducing to bigger scope firefox package: build/cc7.pp -> build.pp
- Almost all build machines are using new configurations
  - 58 machines with new configurations
  - Exceptions: jenkins-master, slc6-physical2 (7 machines)
  - Old configuration exists in branch ‘deprecated’ in environment ‘lcgapp_deprecated’
- Machines divided to qa and production
  - Slowly introduce changes via qa
  - 12 out of 54 machines in qa

Statistics

- Statistics as a plugin
  - system load, memory, storage, logs, IO load, docker
  - plugin written in bash
- Configuration with hiera (yaml) in puppet
- Sampling every minute




Build node disk space
100%
80%
60%
40%
20%
0%
00:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
max
current
centos7-46 81% 66%
centos7-42 77% 41%
centos7-38 75% 43%
centos7-44 73% 50%
centos7-33 73% 58%
centos7-36 71% 35%
centos7-39 69% 69%
slc6-2 63% 54%
centos7-31 61% 61%
centos7-30 59% 59%
centos7-32 58% 31%
centos7-40 57% 57%
Memory info
Memory use
max
avg
current
lcgapp-slc6-physical1 92% 84% 85%
centos7-47 43% 6% 4%
slc6-2 36% 32% 27%
slc6-8 36% 33% 35%
centos7-33 24% 5% 4%
centos7-31 24% 6% 5%
slc6-36 23% 20% 14%
slc6-30 23% 19% 14%
slc6-10 23% 21% 22%
slc6-37 23% 20% 22%
Load info
Average load 1m
125
100
75
50
25
0
Average load 5m
80
60
40
20
0
lcgapp-centos7-lcgsoft
centos7-10
centos7-11
centos7-16
centos7-17
centos7-19
centos7-20
centos7-21
centos7-23
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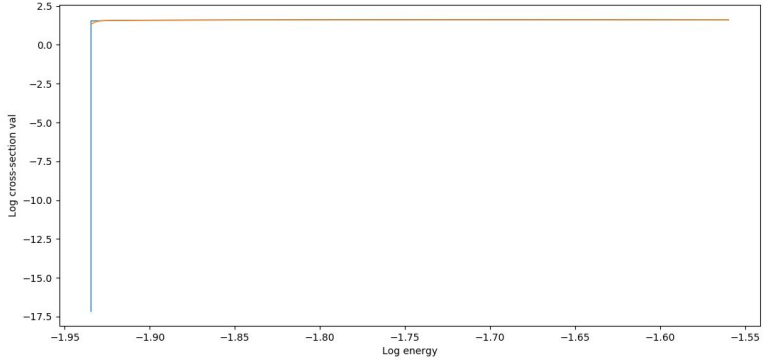
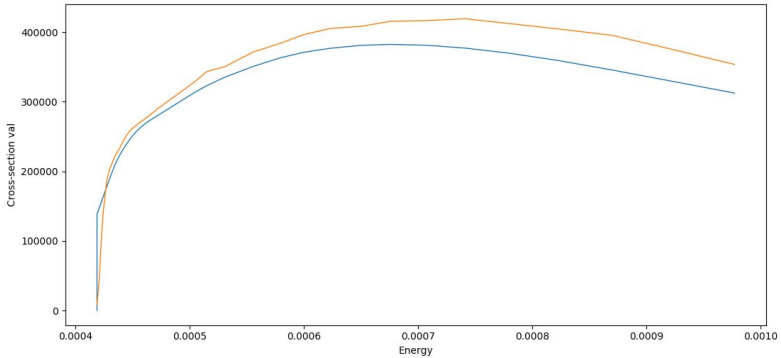
centos7-43
centos7-44
centos7-45
centos7-46
centos7-47
centos7-6
lcgapp-slc6-i386-1
lcgapp-slc6-i386-3
lcgapp-slc6-physical1
lcgapp-slc6-tensorflow-buildmachine
slc6-10
slc6-11
slc6-12
slc6-18
slc6-2
slc6-20
slc6-25
slc6-26

Photoelectric effect with machine learning

- Goal: giving energy, Z and subshell, approximate cross-section
- Implementation
  - Multilayer perceptron implemented with Tensorflow
  - Dataset: epics2014, epics2017
- Tested variations
  - shallow and deep networks
  - various optimizers
  - data preprocessing

f:pe-ss-cs-82.dat-s14





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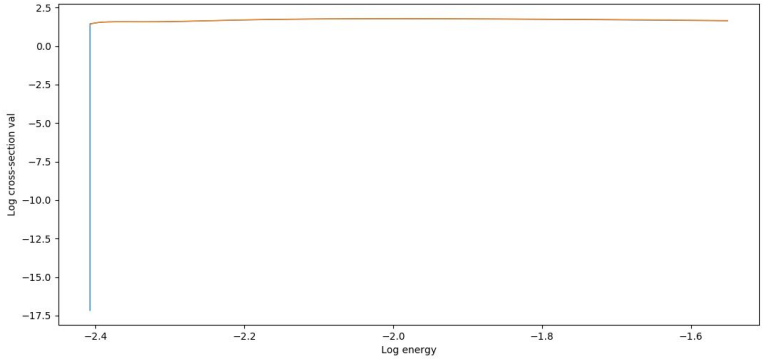

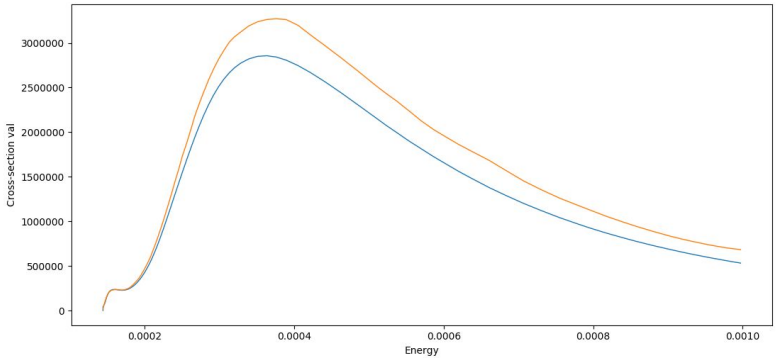

Big thanks to
Patricia Mendez Lorenzo

Thank you