Grid Support for NA62 MC Simulations

Dan Protopopescu
University of Glasgow, UK

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The NA62 *Grid Production Support* group

- What we provide
- Why is this important
- Resources and expertise
- How it all works
- What have we done up to now
- Next production plans

What we provide

- GridPP computer resources from participating grid sites
- Installation and testing of the NA62 Monte Carlo software on sites
- Job submission and management
- A catalogue of output files and data produced
- Delivery of the output data to CERN Castor

Why is this important

- Large scale productions take time
- Grid infrastructure is crucial
  - Distributed CPU resources, parallel jobs
  - Redundant data storage (multiple copies of output files)
  - Transparent for the NA62 collaboration
- Good production data management is very important:
  - Run database (simulation specs, production tags, statistics)
  - Job tracking capabilities
  - File catalogue (specs, event totals, stats)

Resources

- Four participating UK sites
  (+1 in Belgium being set up)
- 300-500 worker nodes
- 70-100 TB of storage space
- GridPP expertise

Components

- Online PHP-based job submission tools combined with a suite of offline scripts and cron jobs
- MySQL database backend running on a dedicated server
- Online job table with search capabilities: all job parameters and input files (JDL, macro, wrapper script) are available for inspection
- Online file table with search capabilities and summary figures
- Online production list table including summary figures
- iPhone app for job monitoring
- All custom-written for this task
- … lots of helpful info displayed on these pages

← webapp (click link, then 'Add to Home Screen')

Script generator utility

Job parameters:

Description (*include here a unique production round identifier*): Production run, decay type 60 (K+ --> pi+ pi- e+ nu)

Run number(s): 341 to [ ] or ☑ clone job 1000 times ← job cloning

Number of events (per run): 1500

Random seed: 341 (for multiple runs this is set equal to the run-number by default)

MC version: 5 ← make sure this matches the wrapper (executable script)

Decay type: 60 K+ --> pi+ pi- e+ nu (Ke4)

Radiative corrections: ○ on ◉ off

Disable detector(s): none,none

Disable Cedar Cherenkov Effect: ☐

Output file name: pluto_v5_r341.root

LFC directory: /castor/cern.ch/grid/na62/mc/ production /CHANNEL

Script parameters:

Destination (any of): ☑ GLA ☑ IC ☑ LIV ☑ RAL ☐ UCL

Executable script: RunNA62MCJob7.sh

Display commented lines from scripts: ☐

Write scripts to disk: ☑ + enter pin to confirm: *******

← scripts are created and saved on disk

Prepare or

Job list

tasks menu

table menu

Search | Jobs | Files | Production | Scripter | Refresh | Show all | Expand

[x]	Run number	Decay type	Number of events	MC S/w Version	Submission Date/Time	Submitted by	Site	Files JDL	Mac	Exe	Out	Err	Job Status	Status URL	MC Output
☐	338	60	1000	5/r170	17 Aug 09:44:40	protopop	GLA	↗	↗	↗	↗	↗	CLEARED	LINK	-
☐	337	60	1000	5/r170	17 Aug 09:44:35	protopop	IC	↗	↗	↗			RUNNING	LINK	-
☐	336	60	1000	5/r170	17 Aug 09:44:11	protopop	GLA	↗	↗	↗	↗	↗	CLEARED	LINK	-
☐	335	60	1000	5/r170	17 Aug 09:42:58	protopop	RL	↗	↗	↗			RUNNING	LINK	-
		Description: Test jobs **Decay channel:** 60 (radiative corrections applied), random_seed=331 **Status command:** glite-wms-job-status https://wmslb01.grid.hep.ph.ic.ac.uk:9000/gJtU7V2lc5kDU8cPephVSw **CE:** lcgce05.gridpp.rl.ac.uk:8443/cream-pbs-grid2000M														
☐	334	60	1000	5/r170	17 Aug 09:42:30	protopop	RL	↗	↗	↗			CANCELLED	LINK	-
☐	333	60	1000	5/r170	17 Aug 09:42:25	protopop	GLA	↗	↗	↗	↗	↗	CLEARED	LINK	-
☐	332	60	1000	5/r170	17 Aug 09:42:21	protopop	RL	↗	↗	↗			RUNNING	LINK	-
☐	331	60	1000	5/r170	17 Aug 09:41:50	protopop	LIV	↗	↗	↗			RUNNING	LINK	-
☐	330	43	100	5/r170	15 Aug 13:11:56	protopop	LIV	↓	↓	↗	↗	↗	CLEARED	LINK	OK
☐	329	43	100	5/r170	15 Aug 13:11:25	protopop	RL	↓	↓	↗	↗	↗	FAILED	LINK	-
☐	328	43	100	5/r170	15 Aug 13:10:46	protopop	GLA	↓	↓	↗	↗	↗	CLEARED	LINK	-
☐	327	43	100	5/r170	15 Aug 13:10:27	protopop	GLA	↓	↓	↗	↗	↗	CLEARED	LINK	-
☐	326	43	100	5/r170	15 Aug 13:10:12	protopop	IC	↗	↗	↗	↗	↗	CLEARED	LINK	OK

← expanded info

links to the corresponding text files

File browser

table menu

Search | Jobs | Files | Production | Scripter | Refresh | Show all | Expand

[x]	Run number	File name	Decay type	Number of events	File size	GUID
☐	296	pluto_v5_r296.root	60	1500	438 MB	5d633223-7b26-4f54-8fa3-98d74a127fc0
☐	295	pluto_v5_r295.root	60	1500	438 MB	8b0837db-6f5b-480e-9f73-f62f15c4d77a
☐	294	pluto_v5_r294.root	60	1500	440 MB	cf6f8135-83e9-4ee9-a184-04740c7d8316
☐	293	pluto_v5_r293.root	60	1500	445 MB	94131e53-3b88-4bf2-9ca1-03f6cdb5ed79
☐	291	pluto_v5_r291.root	60	1500	437 MB	ea50b5f7-9216-425f-82ce-accbeaf19697
☐	288	pluto_v5_r288.root	60	1500	440 MB	26d9134e-0382-475b-b201-64cbe473d222
☐	287	pluto_v5_r287.root	60	1500	440 MB	423a6442-c765-48d6-8d04-2c82ac941c5a
☐	286	pluto_v5_r286.root	60	1500	433 MB	4014225a-f334-44e4-abe3-d08ca4543dbf
☑	260	pluto_v5_r260.root	60	1800	522 MB	194b97b9-49e4-4ea8-a511-76d4169858a8
		Description: Simulation job (part of the first 100k production) **File size:** 546745047 B **Get command:** lcg-cp -v lfn:/grid/na62.vo.gridpp.ac.uk/users/protopop/prod60/pluto_v5_r260.root pluto_v5_r260.root				
☐	256	pluto_v5_r256.root	60	1800	523 MB	5eae287c-5a15-4cb8-824d-84038bf8a4aa
☐	255	pluto_v5_r255.root	60	1800	528 MB	6b36e2fc-a06e-4447-8192-b774ce04b1a8
☐	254	pluto_v5_r254.root	60	1800	526 MB	084c68a5-600b-48c3-8a38-c4de494810db
☐	252	pluto_v5_r252.root	60	1800	530 MB	b91681a5-12de-4e05-a8bd-81b94c6be7f3

← expanded info

Production table

Jobs | Files | **Production** | Scripter | Refresh | Show all | Expand

Name	Description	Runs	Files	Total size
Kch2pipienu-1	First production, 100k events, decay type 60 K+ --> pi+ pi- e+ nu (Kch2pipienu)	124	94	40.95 GB
	Date interval: 07 Jun 13:25 - 8 Jul 01:30 **Run numbers:** 136 - 296 **Job success rate*:** 76%			
	Total: 124 runs, 94 data files, 40.95 GB of data on Castor			

Sites

← stats

Site	Queue	Jobs run	Jobs done	Success rate* (%)
GLA	svr008.gla.scotgrid.ac.uk:8443/cream-pbs-q2d	15	14	94
GLA	svr014.gla.scotgrid.ac.uk	0	0	0
GLA	svr014.gla.scotgrid.ac.uk:8443/cream-pbs-q2d	22	21	96
IC	ceprod06.grid.hep.ph.ic.ac.uk:8443/cream-sge-grid.q	16	15	94
GLA	svr014.c[illegible]	[illegible]	1	100
	[illegible]	[illegible]		
	[illegible]gce05.gridpp.rl.ac.uk:8443/cream-pbs-grid500M	4		
GLA	svr026.gla.scotgrid.ac.uk:8443/cream-pbs-q1d	6	3	50
IC	ceprod08.grid.hep.ph.ic.ac.uk:8443/cream-sge-grid.q	3	3	100
LIV	hepgrid10.ph.liv.ac.uk:8443/cream-pbs-long	1	0	0
LIV	hepgrid6.ph.liv.ac.uk:8443/cream-pbs-long	0	0	0
	Overall performance:	**131**	**101**	**78 %**

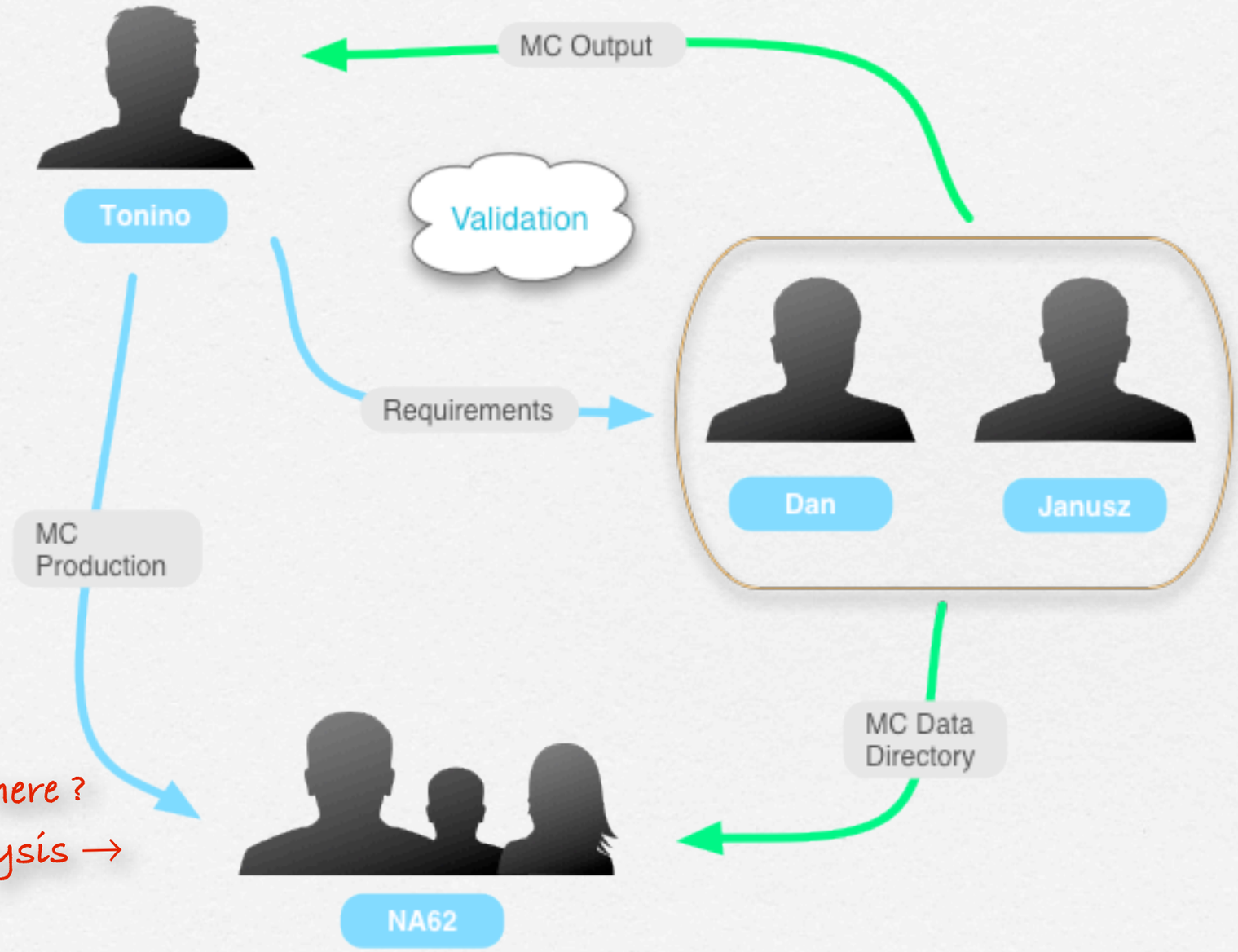
How it all works

- Software packages are provided by Tonino
- Software package installation is done by Janusz
- Site support is provided by the site admins
- Job submission is done by Dan using the scripts generated by the online tools
- Job tracking and DB logging are done automatically via cron jobs
- Production stats are updated automatically
- Output data in stored redundantly at several locations
- One copy of every (root) output file is stored on Castor at CERN
- Documentation:

  http://ppes8.physics.gla.ac.uk/twiki/bin/view/NA62/NA62MonteCarlo

Production Workflow

- Software development group liaison person: Antonino Sergi
- Production manager (and job baby-sitter): Dan Protopopescu



What do you do with the data here ?
What about having weekly analysis → trial runs ?

What have we done up to now

- Ran our first (mini) production between June 7th and July 8th, 2012

Kch2pipienu-1	First production, 100k events, decay type 60 K+ --> pi+ pi- e+ nu (Kch2pipienu)	124	94	40.95 GB
	Date interval: 07 Jun 13:25 - 8 Jul 01:30 **Run numbers:** 136 - 296 **Job success rate*:** 76%			
	Total: 124 runs, 94 data files, 40.95 GB of data on Castor			

- MC software release r170
- Totals: 124 runs, 143300 events
- Average duration of a 1500 events job: 21 hours
- Average CPU time per event: 51s
- 94 data files produced (success rate 76% due to testing phase)
- 41GB of data on Castor at CERN

↖ a bit more than we were asked for

What do we want to do next

- Install the latest MC software release on grid sites (we need a green light from Tonino)

- Start production of 10^7 events, Kch2pipienu decay channel

Name	Description	Runs	Files	Total size
Kch2pipienu-2	Production run, 10^7 events, decay type 60 (K+ --> pi+ pi- e+ nu)	0	0	n/a
	Details: n/a			

- We estimate this will take ~2 months until completed

$10^7 \times 51/3600/24/30/0.76/150 \approx 1.73$ months
$10^7 \times ((21+3)/1500)/24/30/0.76/150 \approx 1.95$ months

↖ assuming that only half of our worknodes run at any given time

- So, when can we start and what are NA62's time constraints ?

- Any plans for analysis on the grid later on ?