

GridPP Support for NA62 MC Simulations

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NA62

- ❑ Experiment on the CERN SPS, using 400 GeV/c protons
- ❑ 28 member institutes, 270 participants (4 and 25 from UK, respectively)
- ❑ Aimed to measure the very rare kaon decay $K^+ \rightarrow \pi^+ + \nu + \bar{\nu}$
- ❑ The goal is to extract a 10% measurement of the CKM parameter $|V_{td}|$
- ❑ Plans to collect about 80 $K^+ \rightarrow \pi^+ + \nu + \bar{\nu}$ events if the Standard Model prediction is correct
- ❑ Expected signal to background ratio is 10:1
- ❑ Two years of data taking, starting in the fall of 2013



NA62 requirements

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



Resources

- Five participating UK sites (+2 in Europe)
- 300–500 worker nodes
- 70–100 TB of storage space
- GridPP expertise



Wanna
join?



Setup 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 (this could be merged later on with NA62's offline DB)
- 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



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

Script generator

Job parameters:

Description (include here a unique production round identifier):

Kch2munu-1 production job

Run number(s):

411 to or clone job times ← job cloning

Number of events (per run):

1500

Random seed:

411 (for multiple runs this is set equal to the run-number by default)

MC version:

6 ← make sure this matches the wrapper (executable script)

Decay type:

30 K+ --> mu+ nu (2 body)

Radiative corrections:

on off

Disable detector(s):

none,none

Disable Cedar Cherenkov Effect:

Output file name:

pluto_v6_r411.root

LFC directory:

/castor/cern.ch/grid/na62/mc//CHANNEL

Script parameters:

Destination (any of):

GLA IC LIV RAL BIR UCL CNAF

Executable script:

RunNA62MCJob8.sh

Display commented lines from scripts:

Write scripts to disk:

+ enter pin to confirm: ← scripts are created and saved to disk

Prepare

Job submission is done using scripts generated by online tools

Job tracking and DB logging are done automatically via cron jobs

Production stats are updated automatically

Output data is stored redundantly at several locations, with one copy stored on Castor at CERN

Job list

tasks menu

table menu

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

[x]	Run number	Decay type	Number of events	MC SW Version	Submission Date/Time	Submitted by	Site	Files					Job Status	Status URL	MC Output
								JDL	Mac	Exe	Out	Err			
<input type="checkbox"/>	338	60	1000	5/r170	17 Aug 09:44:40	protopop	GLA						CLEARED	LINK ▶	-
<input type="checkbox"/>	337	60	1000	5/r170	17 Aug 09:44:35	protopop	IC						RUNNING	LINK ▶	-
<input type="checkbox"/>	336	60	1000	5/r170	17 Aug 09:44:11	protopop	GLA						CLEARED	LINK ▶	-
<input type="checkbox"/>	335	60	1000	5/r170	17 Aug 09:42:58	protopop	RL						RUNNING	LINK ▶	-
<p>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</p>															
<input type="checkbox"/>	334	60	1000	5/r170	17 Aug 09:42:30	protopop	RL						CANCELLED	LINK ▶	-
<input type="checkbox"/>	333	60	1000	5/r170	17 Aug 09:42:25	protopop	GLA						CLEARED	LINK ▶	-
<input type="checkbox"/>	332	60	1000	5/r170	17 Aug 09:42:21	protopop	RL						RUNNING	LINK ▶	-
<input type="checkbox"/>	331	60	1000	5/r170	17 Aug 09:41:50	protopop	LIV						RUNNING	LINK ▶	-
<input type="checkbox"/>	330	43	100	5/r170	15 Aug 13:11:56	protopop	LIV	↓	↓				CLEARED	LINK ▶	OK
<input type="checkbox"/>	329	43	100	5/r170	15 Aug 13:11:25	protopop	RL	↓	↓				FAILED	LINK ▶	-
<input type="checkbox"/>	328	43	100	5/r170	15 Aug 13:10:46	protopop	GLA	↓	↓				CLEARED	LINK ▶	-
<input type="checkbox"/>	327	43	100	5/r170	15 Aug 13:10:27	protopop	GLA	↓	↓				CLEARED	LINK ▶	-
<input type="checkbox"/>	326	43	100	5/r170	15 Aug 13:10:12	protopop	IC						CLEARED	LINK ▶	OK

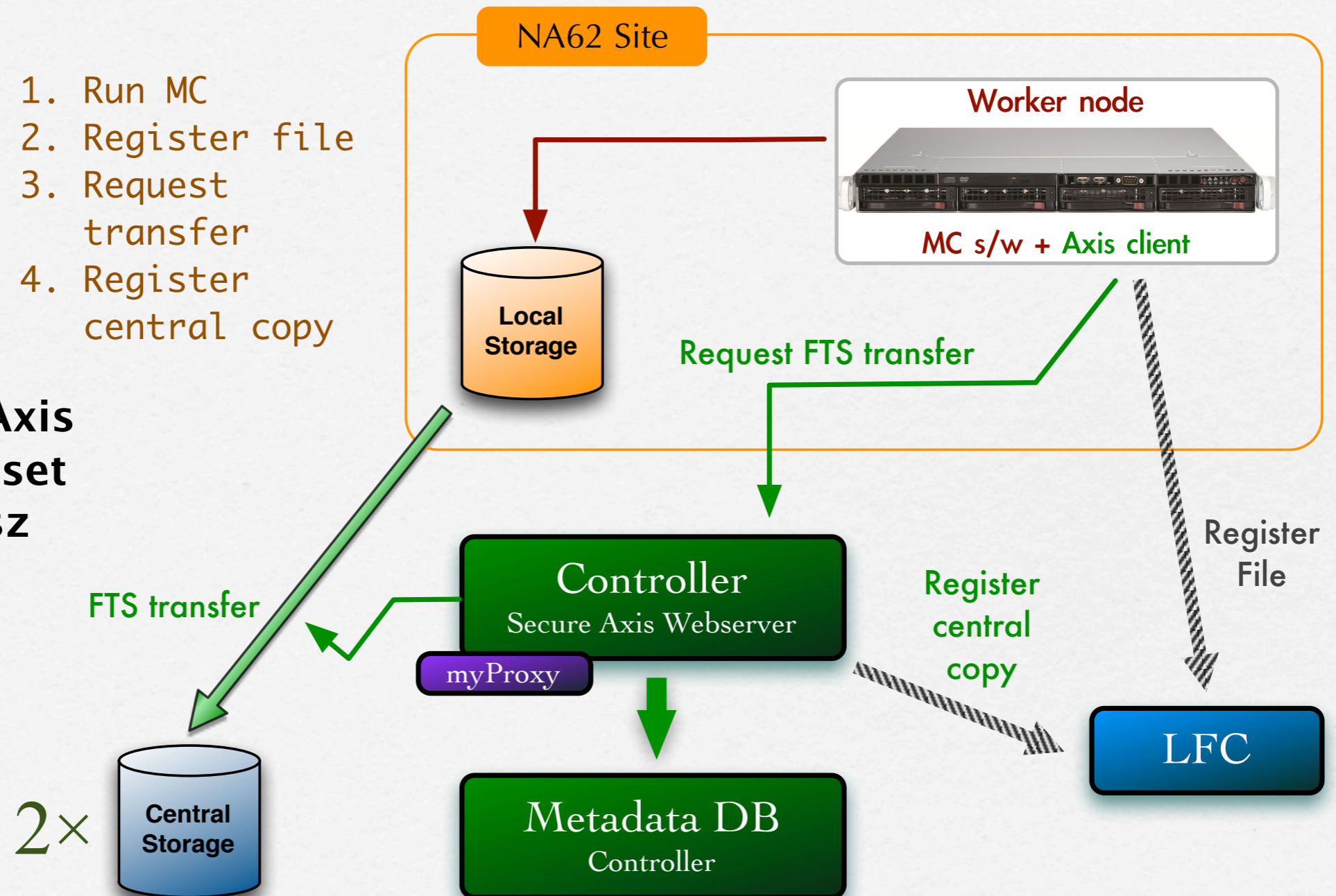
← expanded info

links to the corresponding text files

FTS transfers

1. Run MC
2. Register file
3. Request transfer
4. Register central copy

Dedicated Axis web server set up by Janusz Martyniak



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
<input type="checkbox"/>	296	pluto_v5_r296.root	60	1500	438 MB	5d633223-7b26-4f54-8fa3-98d74a127fc0
<input type="checkbox"/>	295	pluto_v5_r295.root	60	1500	438 MB	8b0837db-6f5b-480e-9f73-f62f15c4d77a
<input type="checkbox"/>	294	pluto_v5_r294.root	60	1500	440 MB	cf6f8135-83e9-4ee9-a184-04740c7d8316
<input type="checkbox"/>	293	pluto_v5_r293.root	60	1500	445 MB	94131e53-3b88-4bf2-9ca1-03f6cdb5ed79
<input type="checkbox"/>	291	pluto_v5_r291.root	60	1500	437 MB	ea50b5f7-9216-425f-82ce-accbeaf19697
<input type="checkbox"/>	288	pluto_v5_r288.root	60	1500	440 MB	26d9134e-0382-475b-b201-64cbe473d222
<input type="checkbox"/>	287	pluto_v5_r287.root	60	1500	440 MB	423a6442-c765-48d6-8d04-2c82ac941c5a
<input type="checkbox"/>	286	pluto_v5_r286.root	60	1500	433 MB	4014225a-f334-44e4-abe3-d08ca4543dbf
<input checked="" type="checkbox"/>	260	pluto_v5_r260.root	60	1800	522 MB	194b97b9-49e4-4ea8-a511-76d4169858a8
<p>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</p>						
<input type="checkbox"/>	256	pluto_v5_r256.root	60	1800	523 MB	5eae287c-5a15-4cb8-824d-84038bf8a4aa
<input type="checkbox"/>	255	pluto_v5_r255.root	60	1800	528 MB	6b36e2fc-a06e-4447-8192-b774ce04b1a8
<input type="checkbox"/>	254	pluto_v5_r254.root	60	1800	526 MB	084c68a5-600b-48c3-8a38-c4de494810db
<input type="checkbox"/>	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

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.gla.scotgrid.ac.uk	1	1	100
GLA	svr014.gla.scotgrid.ac.uk:8443/cream-pbs-grid500M	4	4	100
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 %

← stats

Pre-production tests

- ❑ 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
- ❑ 41GB of data on Castor at CERN

Presented at the
NA62 CM
in August

Production plan
drafted

Production

- ❑ Installed the latest MC software release at the participating sites
- ❑ Started production of 3×10^7 events based on the schedule discussed at the last NA62 CM

We estimate that the first batch of 10^7 events will take ~ 2 months to complete

- ❑ Make plans to distribute simulation data for analysis on the grid

Jobs status

Channel	Channel ID	Events (M)	Priority
$\pi^+\nu\nu$	0	5	1
$e^+\nu$	20	5	
$e^+\nu\gamma$	21	5	
$\mu^+\nu$	30	10	1
$\mu^+\nu\gamma$	31	10	1
$\pi^+\pi^0$	1	10	1
$\pi^+\pi^0\gamma$	2	10	1
$\pi^+\pi^+\pi^-$	10	40	1
$\pi^+\pi^-\pi^0$	60	5	1
$\pi^0e^+\nu$	11	1	
$\pi^0\mu^+\nu$	40	1	
$\pi^0\mu^+\nu$	41	1	
$\pi^+\gamma\gamma$	83	1	
$\pi^+e^+e^-$	120	0.5	
$\pi^+\gamma e^+e^-$	84	0.5	
$\pi^+\mu^+\mu^-$	121	0.5	
$\pi^+\gamma\mu^+\mu^-$	85	0.5	
$\pi^+\pi^0e^+e^-$	soon	0.5	
$e^+\nu e^+e^-$	100	0.5	
$\mu^+\nu e^+e^-$	101	0.5	
$e^+\nu\mu^+\mu^-$	102	0.5	
$\mu^+\nu\mu^+\mu^-$	103	0.5	
$\pi^+\mu^+e^-$	130	0.5	
$\pi^+\mu^-e^+$	131	0.5	
$\pi^-\mu^+e^+$	132	0.5	
$\pi^-e^+e^+$	133	0.5	
$\pi^-\mu^+\mu^-$	134	0.5	
$\mu^-e^+e^+$	141	0.5	
$e^-\nu\mu^+\mu^+$	140	0.5	
TOTAL		112	