

# ATLAS Releases: Build, Packaging and Deployment - short overview

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# Introduction

- The ATLAS software is composed of multiple projects that are each built up out of many packages.
- After using CMT for many years, at the beginning of 2016 the build of the software releases has been switched over to CMake.
- Around 2200 packages provide:
  - shared libraries to be used by other packages
  - module libraries used by the framework to load software components
  - executables performing specialized tasks
  - scripts, config files - to be installed with the package build target
- A package declares what other packages it needs for its own build.
- A project - a collection of packages built according to the dependency declaration.

# ATLAS Project - Highest Complexity

## Build Overview



- LCG - represents the externals provided by the LCG release
- tdaq, tdaq-common, dqm-common - online software built with their own configuration
- GAUDI - built using its own CMake configuration
- still building this type of release every night providing fixes and patches for some old releases

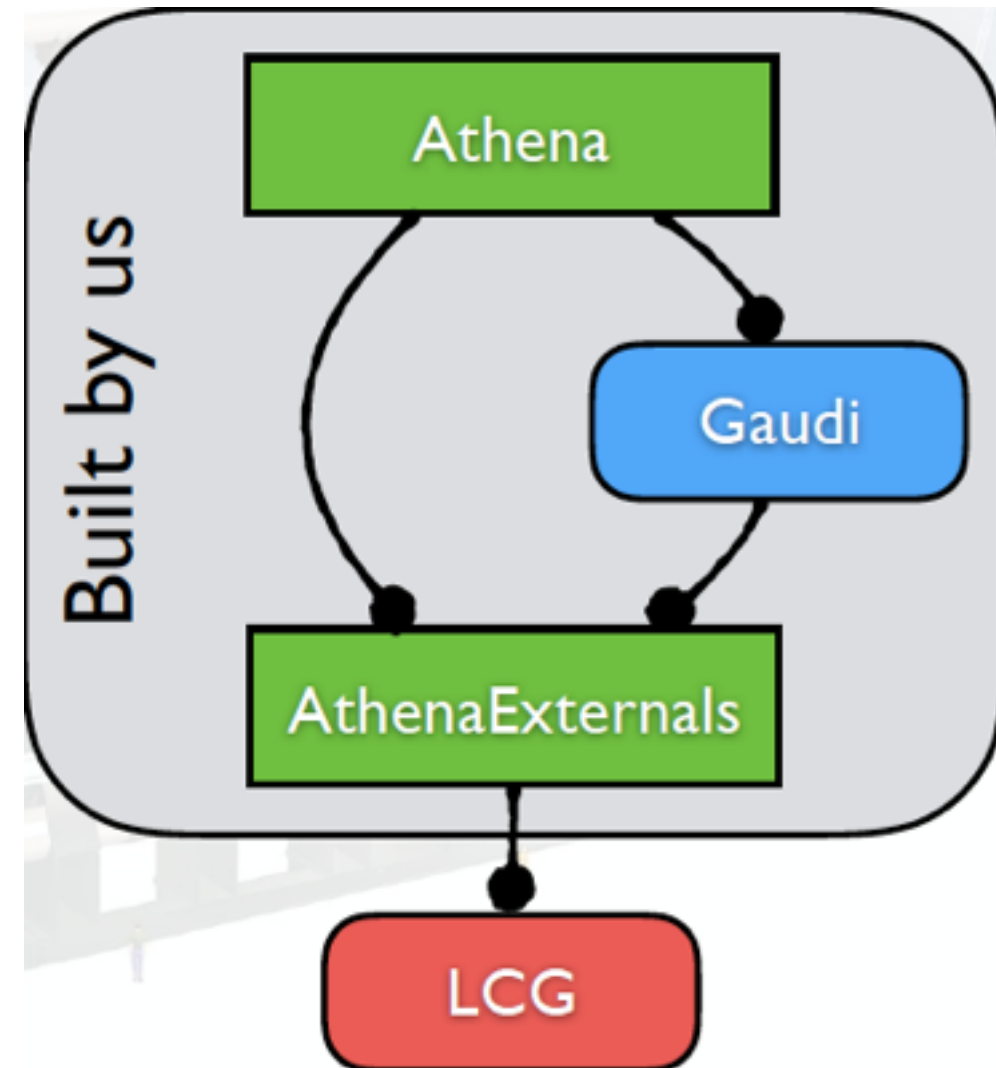
# The Athena Project

- The Athena project structure was simplified.
- Dependencies: AthenaExternals and Gaudi (tdaq, tdaq-common, dqm-common)
- Versioning - we build each night a particular state of athena git repository together with versions of LCG, AtlasExternals & Gaudi
- The version of LCG (and tdaq/dqm-common) is hardcoded in AthenaExternals project CMakeLists.txt:

```
31 # Set up which LCG version to use:  
32 set( LCG_VERSION_POSTFIX "" )  
33 set( LCG_VERSION_NUMBER 87 )  
34 find_package( LCG ${LCG_VERSION_NUMBER} REQUIRED EXACT )
```

- Specific version of AthenaExternals and Gaudi needed - taken from the externals.txt file

```
8 AthenaExternalsVersion = 1.0.4  
9 GaudiVersion = v28r1.005
```



- Steps of the build:
- master CMakeLists.txt file describing the project
  - **AtlasSetup** tool sets up:
    - the environment e.g. TDAQ\_RELEASE\_BASE
    - the gcc compiler
    - version of CMake to use
- Find the base project(s) that it depends on
- Relocatable RPMs - environment variables guide the build configuration for CTest and CPack
- **AthenaExternals** - first project to build and install
  - the setup.sh is sourced to set it up for the other projects
- **GAUDI** is built next and installed (“GAUDI\_ATLAS mode”)
  - GAUDI\_ROOT points to the installed location of Gaudi
- **Athena** is built and installed last

# Scripts

- General scripts, used for building Athena as well as other project flavors (AnalysisBase, AthDerivation, AthAnalysis etc.) can be used from Build/AtlasBuildScripts
  - checkout scripts for AtlasExternals and Gaudi
  - environment setup scripts
- Project specific scripts are put into the main directory of that project, e.g. Projects/Athena
  - **build\_externals.sh** - a script building all externals
  - **build.sh** - a script building the Athena project
- Private manual builds are possible and easy thanks to all that.

# Standard Builds & Packaging

- The build is done basically using:

```
asetup none,gccXX --cmakesetup  
./athena/Projects/Athena/build_externals.sh  
./athena/Projects/Athena/build.sh
```

- Build done on local disk (~130GB OPT and ~180GB DBG)
- nightly RPMs are release candidates which can be used directly to distribute a release on the grid
- CPack used, having the option of producing opt/dbg rpms
- Once the rpms are locally built, they are copied to EOS (distributed file system) by additional script. The rpms are http accessible for installations.

# Distribution

- Python scripts used for the cvmfs installation (some 2780 lines of code - of which ca 900 lines belong to monitoring)
  - Create date-time directories for every nightly release, e.g.:
    - /cvmfs/atlas-nightlies.cern.ch/repo/sw/master/
      - drwxr-xr-x. 5 cvmfs cvmfs 7 Nov 27 04:59 2017-11-26T2257 → 

3 Nov 27 04:35	AthenaExternals
3 Nov 27 04:36	GAUDI
3 Nov 27 04:36	Athena
      - /cvmfs/atlas-nightlies.cern.ch/repo/sw/21.0 / 21.1 / 21.2 / 21.3 / ...
  - LCG, external sw, tdaq-/dqm-common used in common by several nightlies:

```
atlas
Geant4
sw
tdaq-common
dqm-common
```

- Possible to **install a nightly anywhere else** (using a standalone script) as **user**.
- **Private builds** can be installed as well on cvmfs to be used by all users.



# Plans for improvements which might help HPC porting

- Having the option to save the binaries of AthenaExternals e.g. and not start a build every time from scratch
- We'd like an easy way of building and reusing existing binaries
  - Nexus - sw repository to store binary artifacts
  - git LSF ?
- Breaking up the large rpm file into several smaller chunks
- Include the build of LCG/tdaq-/dqm-common into our own build procedure

# Monthly release build overview

Mon 11 December	Tue 12 December	Wed 13 December	Thu 14 December	Fri 15 December	Sat 16 December	Sun 17 December	Total
Athena 21.0.53	MCProd 20.7.9.9.9 AthenaP1 21.5.3						3
Mon 4 December	Tue 5 December	Wed 6 December	Thu 7 December	Fri 8 December	Sat 9 December	Sun 10 December	Total
		MCProd 19.2.5.28.2			AnalysisBase 21.2.12 AthAnalysis 21.2.12 AnalysisTop 21.2.12 AthDerivation 21.2.12.0 AthDerivation 21.2.13.0		6
Mon 27 November	Tue 28 November	Wed 29 November	Thu 30 November	Fri 1 December	Sat 2 December	Sun 3 December	Total
Athena 21.0.20.5	Athena 21.0.45	AthDerivation 21.2.10.0	Athena 21.0.52 AthDerivation 21.2.11.0	MCProd 19.2.5.28.1 AnalysisBase 21.2.11 AthAnalysis 21.2.11 AnalysisTop 21.2.11			9
Mon 20 November	Tue 21 November	Wed 22 November	Thu 23 November	Fri 24 November	Sat 25 November	Sun 26 November	Total
Athena 21.0.44 AthDerivation 21.2.9.0	AtlasProduction 19.2.5.28	AtlasDerivation 20.7.8.28	AtlasProduction 20.7.5.15 Athena 21.0.51				6
Mon 13 November	Tue 14 November	Wed 15 November	Thu 16 November	Fri 17 November	Sat 18 November	Sun 19 November	Total
	MCProd 19.2.5.26.4	AtlasProduction 19.2.5.27 AnalysisBase 21.2.10 AthAnalysis 21.2.10 AnalysisTop 21.2.10	MCProd 19.2.3.3.4 AthDerivation 21.2.8.0	Athena 21.0.43			8
Mon 6 November	Tue 7 November	Wed 8 November	Thu 9 November	Fri 10 November	Sat 11 November	Sun 12 November	Total
AthenaP1 21.1.19		MCProd 19.2.5.26.3	Athena 21.0.42 AthenaP1 21.1.20 AthDerivation 21.2.7.0	Athena 21.0.50 AnalysisBase 21.2.9 AthAnalysis 21.2.9 AnalysisTop 21.2.9 Athena 21.5.2	AtlasDerivation 20.7.9.9		11

43 releases in 37 days - 1.16 per day