

ATLAS Software Infrastructure : LS1 Upgrade Challenges

Alex Undrus

Presentation Scope

- This presentation reports progress for the following WBS items
 - 5.2.2 – Librarian and Infrastructure Services
 - 5.2.1 – Software Validation

Infrastructure Challenge: Expect the Unexpected



Pictured the recent heavy rainfall on Long Island. It caused water damage to properties not in flood zones and with no history of flooding.

LS1 Upgrade and SW Infrastructure

- Increased load as developers exploit new programming techniques, tools, and languages
 - Rate of new stable releases: 1 per work day (summer 2014)
 - Number of nightly releases branches: 70 (July 2014)
 - Unexpected urgent requests (e.g. new nightlies mail facility)
- New kind of release and management tools
 - RootCore
 - Cmake
 - ASG and Derivation projects
- OS and config management upgrade (slc6, puppet)
- ATLAS Infrastructure Upgrade
 - ATLAS Nightly System LS1 upgrade
 - Tag Collector 3
 - Ayum: a replacement for pacman software distribution tool

ATLAS SW Management Challenge

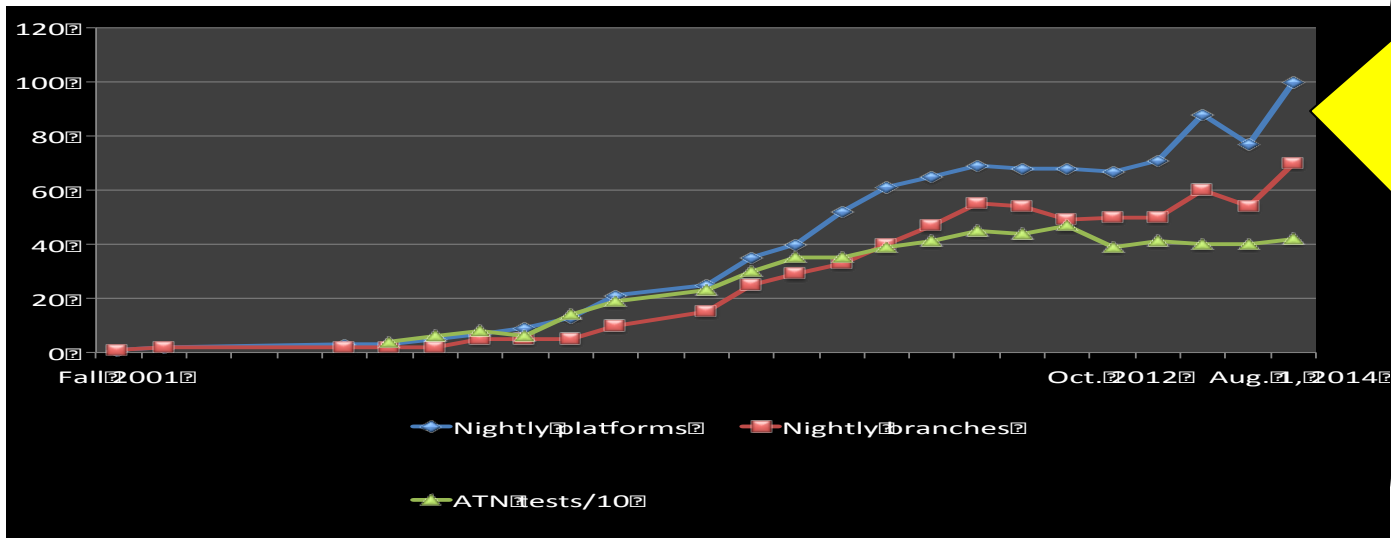
- Management of ATLAS Offline Infrastructure is a big effort (*code configuration, documentation, externals, platforms&compilers, QA/QC, release building and distribution, code repositories, information protection, etc.*)
 - 2300 software packages, millions of code lines (C++ and Python)
 - Hundreds of active developers
 - 70 branches of nightly releases
 - ~ 300 - 400 stable releases annually
 - ~ 100 external packages
- Infrastructure needs both support and development (tools must be updated in sync with software they support)
- Infrastructure is collaboration-wide (no isolated sites)
- ATLAS Software Infrastructure Team (SIT) includes > 20 persons contributing ~ 7 – 8 FTE (ideally ~12 FTE needed)
- U.S. ATLAS contribution to SIT is currently 1.5 FTE

U.S. ATLAS Librarian and Infrastructure Services

- Integral part of ATLAS-wide sw infrastructure services
- Participation in ATLAS-wide infrastructure projects is crucial for U.S. ATLAS
 - Expertise Gain
 - Influence on ATLAS-wide policies and decisions
 - Infrastructure contribution (currently 10 – 15%) should commensurate with U.S. role in ATLAS
- Local user support is essential for U.S. based physicists
- Effort:
 - Alex Undrus coordinates several ATLAS infrastructure projects and task forces, manages and develops ATLAS nightly build system, participates in release building shifts, and uses the gained experience to help with U.S. sw operations management (0.7 FTE)
 - Shuwei Ye provides librarian and user services at U.S. Analysis Center and Tier I (0.3 FTE)

ATLAS Nightly System: Exclusive U.S. Contribution, Critical Service for the Collaboration

- Nightly System is a centrepiece of ATLAS Infrastructure (managed by Alex Undrus)
 - Release building factory on a farm of ~ 50 multi-processor nodes
 - Excellent reliability ($< 1\%$ releases with tech. problems, no downtime)
 - ~ 70 nightlies branches, essential developers get 'personal' branches
 - Nightlies lead up to, and are the basis of, stable sw releases (>300 annually)
 - ATN Nightly Testing Framework: 400 tests in 3 h of build completion
 - CVMFS/AFS availability



DEMAND FOR NIGHTLY SERVICES GREW SHARPLY BY THE END OF LS1 PERIOD: 70 NIGHTLY BRANCHES BUILDING ON 100 PLATFORMS IN TOTAL

U.S. ATLAS Leading Role in SIT Task Forces and Projects

- ATLAS Nightly System LS1 upgrade (SIT Task Force, ATLAS High Priority OT, coordinator Alex Undrus, *WBS 5.2.2*)
 - Objective: increase efficiency, flexibility, and functionality of the Nightly System with modern web and database techniques (PanDA Web Platform, ATLAS Nightlies Oracle DB)
 - Ensured readiness of ATLAS Nightly System for increased load
- Nightly Distributed Testing on the GRID in the HammerCloud distributed test system (joint projects of SIT and HammerCloud, Alex Undrus coordinates from ATLAS side, *WBS 5.2.1*)
 - Catch compatibility problems on various platforms/hardware
 - Test access to storage types

Cont'd->

U.S. ATLAS Leading Role in SIT Task Forces and Projects (cont'd)

- Release Build Acceleration and Optimization (SIT project, participants Alex Undrus and Grigori Rybkine (France) , *WBS 5.2.2*)
 - Includes optimization of CMT commands, adjustment of Nightly System parameters, probe incremental build options and compiler caches
- Validation of Nightly Releases Kits (SIT project, participants Alex Undrus, Shuwei Ye, and Alessandro De Salvo (Italy) , *WBS 5.2.1*)
 - Arrange Kit Validation for patch and full nightly releases (requires updates of KV and sw-mgr tools)
- New ATLAS Nightlies Mail facility (new urgent SIT project, developed by Alex Undrus, *WBS 5.2.2*)
 - Objective: generate customized summary emails for package managers and e-groups and thus reduce the amount of emails from the ATLAS Nightly System while making them more informative.
- More information:
<https://twiki.cern.ch/twiki/bin/viewauth/AtlasComputing/SITTaskForces>

ATLAS Nightly System LS1 Upgrade

- The biggest 2-years long SIT Task Force, ATLAS High Priority OT (coordinator Alex Undrus, participants E. Obreshkov and B.Simmons (CERN))
- Brought modern web and database techniques (PanDA Web Platform, ATLAS Nightlies Oracle DB) into the System
- **On schedule** and close to completion:
 - The 1st phase of the LS1 upgrade commissioned in July 2013 (as planned). Includes all major components such as new dynamic Nightlies Web UI
 - Excellent reliability of Nightlies DB, Web Server since commission
 - The 2nd phase of the LS1 upgrade (until ~ 1Q 2015) in progress:
 - Download time is reduced
 - Multiple improvements of web design
 - Interfaces for release shifters and release coordinators
 - New historical data interface

Information is retrieved from ATLAS Nightly Oracle DB

Wildcard * is allowed in branch and project fields

Branch: Project: Span (days):

Show entries

Search:

BR.	REL.	PLATF.	PROJ.	CONF	TC	CHECK OUT	SETUP	BUILD	COPY	KIT	ATN TESTS	LAST HEARTBEAT	PENDING ACTIONS
19.0.X	rel_1	x86_64-slc6-gcc47-dbg	AtlasCore	06-JUL 21:52	06-JUL 21:52	06-JUL 22:20	06-JUL 22:20	06-JUL 22:38	06-JUL 22:50	<input type="checkbox"/>	06-JUL 23:14	06-JUL 23:32	NONE
19.0.X	rel_1	x86_64-slc6-gcc47-opt	AtlasCore	06-JUL 21:12	06-JUL 21:13	06-JUL 21:35	06-JUL 21:35	06-JUL 21:48	06-JUL 22:04	<input type="checkbox"/>	06-JUL 22:04	06-JUL 22:13	NONE
19.0.X	rel_0	x86_64-slc6-gcc47-dbg	AtlasCore	05-JUL 21:52	05-JUL 21:52	05-JUL 22:17	05-JUL 22:17	05-JUL 22:29	05-JUL 22:40	<input type="checkbox"/>	05-JUL 23:05	05-JUL 23:12	NONE
19.0.X	rel_0	x86_64-slc6-gcc47-opt	AtlasCore	05-JUL 21:12	05-JUL 21:12	05-JUL 21:34	05-JUL 21:34	05-JUL 21:47	05-JUL 22:06	<input type="checkbox"/>	05-JUL 22:03	05-JUL 22:12	NONE
19.0.X	rel_6	x86_64-slc6-gcc47-dbg	AtlasCore	04-JUL 21:53	04-JUL 21:53	04-JUL 22:18	04-JUL 22:18	04-JUL 22:34	04-JUL 22:46	<input type="checkbox"/>	04-JUL 23:11	04-JUL 23:13	NONE
19.0.X	rel_6	x86_64-slc6-gcc47-opt	AtlasCore	04-JUL 21:14	04-JUL 21:14	04-JUL 21:38	04-JUL 21:38	04-JUL 21:51	04-JUL 22:03	<input type="checkbox"/>	04-JUL 22:59	04-JUL 23:00	NONE
19.0.X	rel_5	x86_64-slc6-gcc47-dbg	AtlasCore	03-JUL 21:53	03-JUL 21:53	03-JUL 22:20	03-JUL 22:20	03-JUL 22:33	03-JUL 22:46	<input type="checkbox"/>	03-JUL 23:11	03-JUL 23:12	NONE
19.0.X	rel_5	x86_64-slc6-gcc47-opt	AtlasCore	03-JUL 21:12	03-JUL 21:12	03-JUL 21:35	03-JUL 21:35	03-JUL 21:48	03-JUL 22:04	<input type="checkbox"/>	03-JUL 22:04	03-JUL 22:13	NONE
19.0.X	rel_4	x86_64-slc6-gcc47-dbg	AtlasCore	02-JUL 21:53	02-JUL 21:53	02-JUL 22:17	02-JUL 22:17	02-JUL 22:29	02-JUL 22:40	<input type="checkbox"/>	02-JUL 23:05	02-JUL 23:12	NONE
19.0.X	rel_4	x86_64-slc6-gcc47-opt	AtlasCore	02-JUL 21:12	02-JUL 21:12	02-JUL 21:39	02-JUL 21:39	02-JUL 21:51	02-JUL 22:03	<input type="checkbox"/>	02-JUL 22:59	02-JUL 23:00	NONE
19.0.X	rel_3	x86_64-slc6-gcc47-dbg	AtlasCore	01-JUL 21:53	01-JUL 21:53	01-JUL 22:16	01-JUL 22:16	01-JUL 22:29	01-JUL 22:40	<input type="checkbox"/>	01-JUL 23:05	01-JUL 23:12	NONE
19.0.X	rel_3	x86_64-slc6-gcc47-opt	AtlasCore	01-JUL 21:12	01-JUL 21:12	01-JUL 21:39	01-JUL 21:39	01-JUL 21:51	01-JUL 22:03	<input type="checkbox"/>	01-JUL 22:59	01-JUL 23:00	NONE

NEW: HISTORICAL DATA PAGE:

- Designed to show performance data for long periods of time
- For specific branch, project (wild cards allowed)
- Users request to provide more historical data received (e.g. compilation and test statistics)

Hello Alex@CERN! Welcome to ATLAS Nightlies Administrative Interface

- This form allows Release Coordinators to request stable releases
- Stable release is based on the nightly release indicated in a form
- Request is automatically forwarded to Offline Release Shifters
- Request data and status are stored in a database
- All requests are processed daily

[Comments about this web application](#)

2014-07-07 11:59

Nightly Release Selection	Nightly Name : <input type="text" value="19.1.0.Y-VAL-Prod"/> Nightly Release Name : <input type="text" value="rel_1, date:06-JUL 22:25"/> Stable Release to be created : <input type="text" value="19.1.0.2"/> Platforms choice : <input type="text" value="x86_64-slc6-gcc47-opt,x86_64-slc6-gcc48-opt"/>
Priority	<input checked="" type="radio"/> urgent <input type="radio"/> standard
DBRelease	<input checked="" type="radio"/> latest <input type="radio"/> DO NOT USE latest (prov
Platforms	<input checked="" type="checkbox"/> ALL <input type="checkbox"/> Platforms indicated in com
Installation Options	<input type="checkbox"/> Tier0 <input type="checkbox"/> P1 <input type="checkbox"/> GRID
Nightly switch options	<input type="radio"/> Increment TC release, swi <input type="radio"/> Terminate release in TC, s <input type="text"/> Other (specify in comment

Your Release Request:

Ready for Submission

- Stable Release Name: 19.1.0.2
- Nightly Name: 19.1.0.Y-VAL-Prod
- Nightly Release: rel_1, date:06-JUL 22:25
- Priority: urgent;
- Database Release: latest;
- Platforms: ALL;
- Installation Sites:
- Nightly Switch Directions:
- Comments: Add additional details for the

Your request has been sent

Dear Alexander Undrus!
Your request was sent to the address undrus@bnl.gov.

RELEASE REQUEST FORM:

- Gets information for release requests from Nightly DB (branches, releases, platforms)
- Predefined choices for installation and Nightly switch options
- Automatically sends an email request to shifters and stores request parameters in Oracle DB

Additional Updates for the ATLAS Nightly System

- As a centerpiece of ATLAS sw infrastructure the Nightly System must be in sync with software developers
- Unplanned (in LS1 upgrade) features were or are being added to the System in 2014:
 - Support for RootCore-based releases (done)
 - Support for CMAKE build tool (in progress)
 - Nightly farm update to SLC6 puppet-managed machines
 - Series of tests showed the big advantage of real hardware machines over VM
 - 24 new real hardware machines supplied
 - Multiple problems with puppet and AFS on new machines
 - ATLAS Nightly CVMFS server and Web Server are being upgraded to SLC6
 - Severe problems with puppet management for CVMFS server
 - ATLAS Nightlies mail facility
 - Emergency request from ATLAS sw coordinators
- Some non-essential elements of the Nightlies LS1 Upgraded were postponed (nightlies data preservation, continuous builds) to fulfill emergency requests promptly

U.S. ATLAS Librarian Services

- User support : sw setup (including rcSetup, asetup for RootCore, athena), PROOF farm support, help with xAOD use
- Evaluation of new computers at BNL
- Quality control for CVMFS system
- Code-Browsing service (LXR)
- US ATLAS SVN mirror
- Shuwei Ye also provides support for the U.S. Analysis Center (reported separately) and effectively combines it with librarian tasks

U.S. ATLAS Librarian Services: Accomplishments

- **Users complaints do not exist**
- BNL-based code-browsing service provides ATLAS-wide service
 - Stable and recent Nightly releases are available
- ATLAS sw setup scripts are validated and adapted for a local use at BNL Tier 1 center (by Shuwei Ye)
 - Includes asetup for Athena setup and rcSetup for RootCore setup

U.S. ATLAS Infrastructure and Librarian Services: Priorities and Conclusion

- Critical service task with the main goal to enable physicists to effectively and comfortably use ATLAS software:
 - ATLAS Software is complex
 - Documentation is not always perfect and up-to-date
 - New tools require evaluations and adjustments
 - Physicists need help of software professionals
- Only 1.0 FTE is requested for U.S. ATLAS Infrastructure and Librarian Services:
 - This is a very low manpower, lower than in other areas
 - Two experienced professionals, Alex Undrus and Shuwei Ye, work with high efficiency by effectively combining service with development
 - We are very thin in terms of operations manpower, any reduction will severely undermine the service

U.S. ATLAS Software Validation Task

- Intertwined with the Librarian Services task
- Support of ATN, ATLAS Nightly Test framework (Alex Undrus)
 - ATN runs ~400 tests for the majority of nightly releases
- Nightly Distributed Testing on the GRID in HammerCloud distributed test system (joint projects of SIT and HammerCloud, Alex Undrus coordinates from ATLAS side)
- Validation of Nightly Releases Kits (contributors Alex Undrus and Shuwei Ye)
- Effort:
 - Alex Undrus: 0.3 FTE
 - Shuwei Ye: 0.2 FTE

Software Infrastructure: Plans for FY15

- Continuous task: support and management of the ATLAS Nightly Build system (including the ATN test framework)
 - Additional effort: testing new hardware for the ATLAS build farm
 - Includes build acceleration and optimization
 - Finalize the new Nightlies Mail Facility
 - Port new tools: CMAKE, ayum, Tag Collector 3
 - Participation in stable release building shifts
- ATLAS Nightly System LS1 Upgrade Task Force: completion in 1Q 2015
- Upgrade of ATLAS Nightlies CVMFS service
 - Users increasingly requests more releases and less delay installation
 - Includes work with CERN IT on CVMFS puppet module
- Continuation of the Nightly Distributed Testing on the GRID project, focus on a test scope increase
- Arrange validation of Nightly Releases Kits

Cont'd->

Software Infrastructure: Plans for FY15 (cont'd)

- Continuous task: U.S. ATLAS librarian services
 - Code-browsing service (LXR)
 - rcSetup development (setup procedure for RootCore releases)
 - U.S. ATLAS user support
 - Help with software setup
 - Assist with data access, format (xAOD)
 - Includes support services at Tier 1 XROOTD/PROOF farm

Software Infrastructure Mid&Long Term Plans

- Unchanged since the last year report
- Demonstrate advantages of Distributed Testing and increase its scope (and evaluate GRID tech. trends)
 - Target: Q3 2017
- Evaluate benefits and create prototype of Distributed Build system
 - Target: Q3 2017
- Evaluate new technologies for LS2 upgrade
 - Target: Q4 2017
- LS2 upgrade of ATLAS Nightly and related systems
 - Target: Q1 2019

Summary

- U.S. ATLAS Infrastructure Services support is very thin in terms of manpower
- Nevertheless U.S. ATLAS provides crucial support for critical ATLAS-wide infrastructure projects and ensures quality librarian services for U.S.-based physicists
- Reduction of existing 1.5 FTE Infrastructure Support force will undermine critical services for U.S. ATLAS (and for the whole ATLAS collaboration)

BACKUP SLIDES

FY14-15 FTE profile for WBS 5.2

	Name	FY14	FY15 (plan)
SW VALIDATION	Undrus	0.3	0.3
SW VALIDATION	Ye	0.2	0.2
LIBRARIAN AND INFRASTRUCTURE	Undrus	0.7	0.7
LIBRARIAN AND INFRASTRUCTURE	Ye	0.3	0.3

Software Infrastructure: Milestones for FY15

- Continuous task: U.S. ATLAS librarian and infrastructure services (LXR, User Support, sw setup for athena- and RootCore-based releases)
- Continuous task: support and management of the ATLAS Nightly Build system (including the ATN test framework)
- ATLAS Nightly System LS1 Upgrade TF: completion in 1Q 2015
- New ATLAS Mail Facility:
 - Beta version: 4Q 2014
 - Production version: 3Q 2015
- Nightly System Interface for CMAKE: 3Q 2015
- Upgrade of ATLAS Nightlies CVMFS service: 2Q 2015
- Arrange validation of Nightly Releases Kits for major nightlies branches: 3Q 2015