

RunJob

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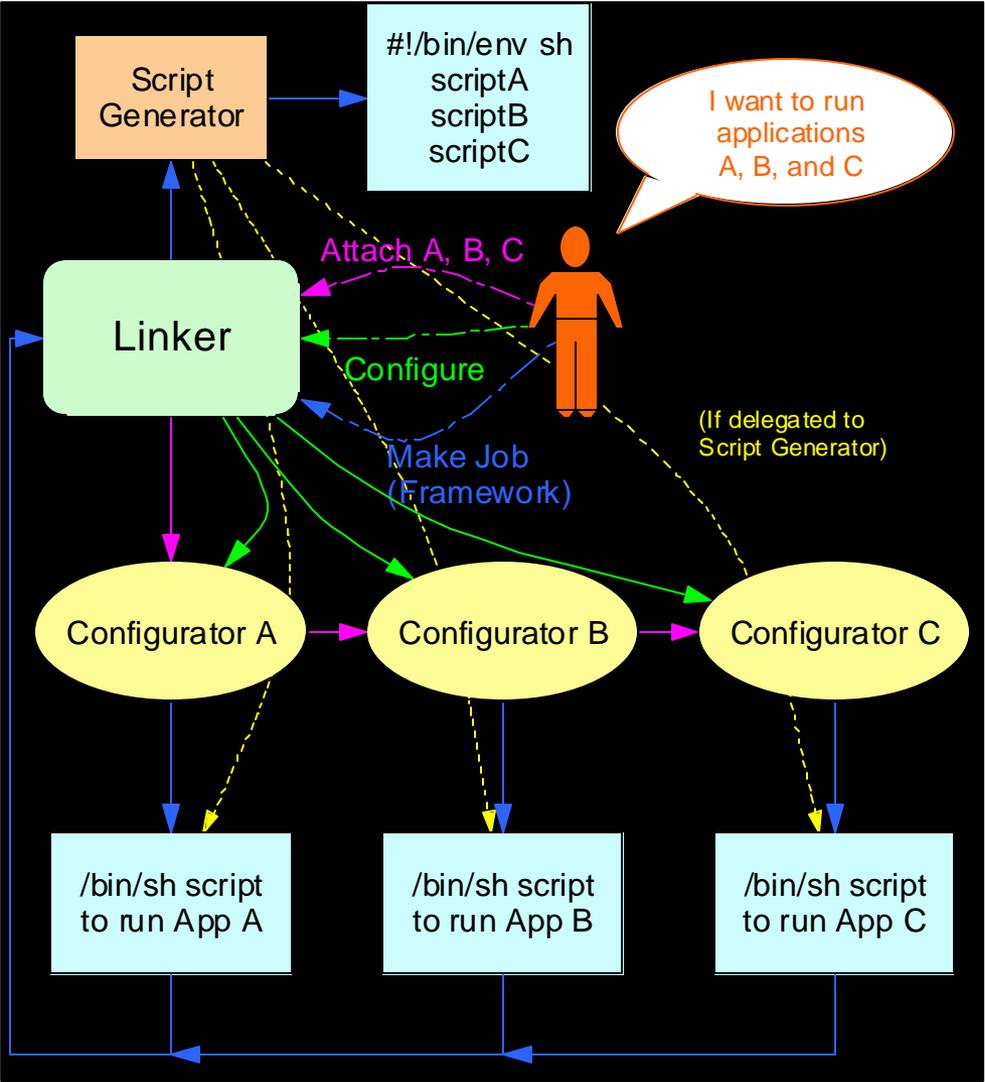
What is RunJob?

- RunJob is a tool to build Grid or local jobs based on user specification of metadata with support for:
 - multi-application workflows
 - parallelization
 - instrumentation for monitoring and control
- RunJob is script based so that a RunJob macro script contains provenance as well as procedural information on how to build jobs.
 - XML standard for the RunJob macro scripts available soon
- Variants are being used at DZero, CMS, and CDF.
 - A project, “RunJob,” is underway at Fermilab CD to guide common development where appropriate

Modular Design

- Configurator: Each application step or external service or database lookup is represented internally as
 - A set of metadata that describes the application or service invocation together
 - dynamically registered functions that execute transformations on the metadata during job building
- Linker: creates the runtime bits that execute the job.
 - Runs the framework which executes the Configurator functions and generates scriptObjects
 - Collects scriptObjects for each target environment
 - eg- VDL(Chimera), Shell scripts, MOP (Condor DAGs)
 - Each target environment is also modeled as a Configurator

RunJob Architecture



Metadata Constraints

- Metadata which describes the job can be explicitly constrained
 - Attributes can be set on key-value pairs which specify metadata references instead of straight values.
 - Example of metadata constraints:
 - site dependent runtime conditions
 - physics group favored calibration parameters.
- Configurators can have explicit dependencies which are then used to express either data flow or metadata flow.

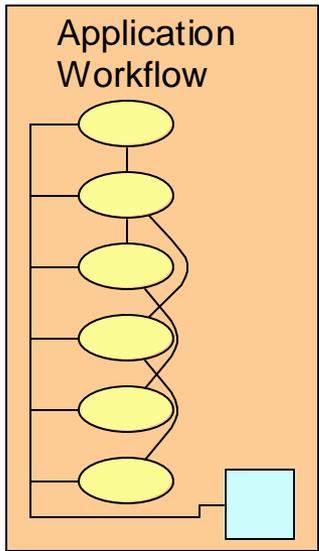
Delegation

- Delegation is a mechanism which allows multiple target runtime environments to be targeted simultaneously.
 - Metadata transforming “framework calls”, normally handled locally by each Configurator, are handled by “Delegate” Configurators.
 - Eg- VDLConfigurator, MOPDagGen, ImpalaLite(CMS), DZero runtime environment, etc.
 - Multiple delegates allow targeting of multiple or composable environments.
 - Eg- Including ImpalaLite and MOPDagGen simultaneously generates DAGs that target the CMS runtime environment.

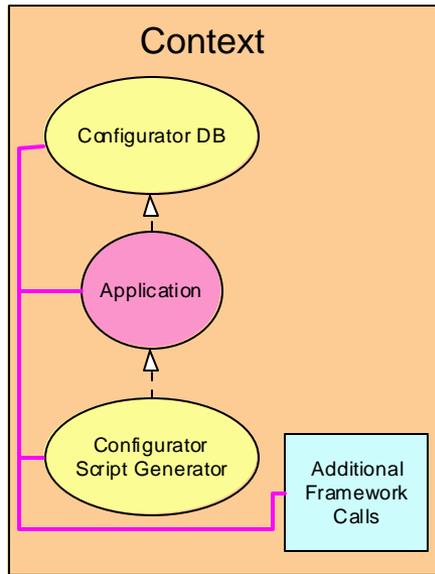
Contexts

- A collection of rules specifying metadata definitions, constraints, Configurator dependencies, and delegations is called a Context.
 - A context modifies “on the fly” an existing RunJob macro script to tailor it to specific environments.
 - Contexts should be composable
 - Eg- “CMSProduction.ctx:MOP.ctx:FNAL.ctx:JetMet.ctx”
 - This is still an open issue in RunJob
- Certain pieces of the context can be tied to the extended VOMS proxy (Yujun Wu, FNAL)
 - Ie- A runjob-context-init client can be run after voms-proxy-init to obtain proper context information.

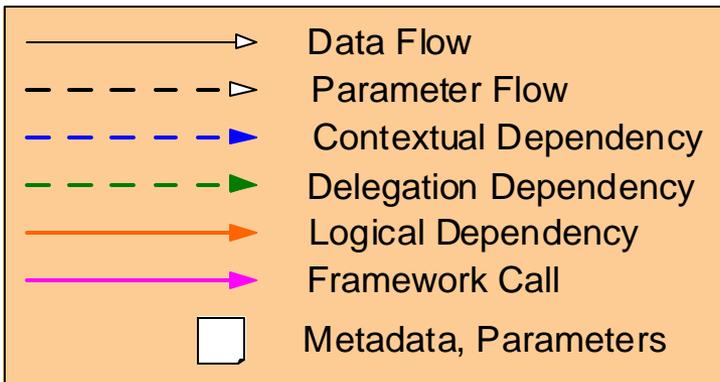
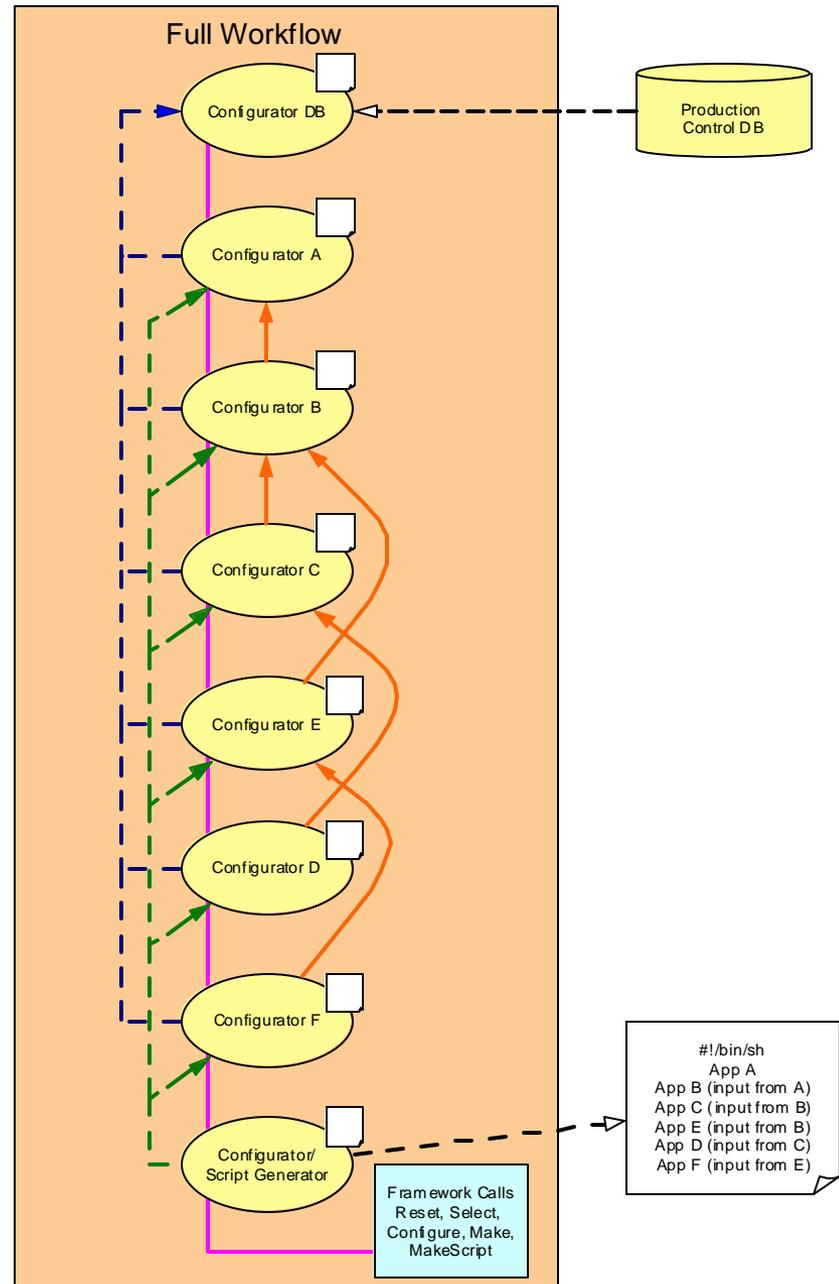
Runjob Contexts



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Conclusion

- RunJob is a modular framework for job creation
 - Script driven, can be used as provenance (XML coming)
 - Ability to express data flow as well as metadata flow
 - Ability to specify constraints on metadata
 - Delegation for multiple composable runtime environments
 - Composable contexts for on-the-fly modification of macro scripts.
- Near term plans
 - CLARENS based Web Services decomposition of Linker
 - Explore context serving client on top of VOMS extended proxy
 - Full XML Schema specification of RunJob macro scripts and contexts.
 - Updated documents circulated for comment.
 - Existing documentation: CHEP 2003 (TUCT007)
 - But this even is already dated.