

HP Storage and Computing @ UMCG

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DTLS
Fri September 30th • 2016 • Utrecht

Dependency Management

- Deploy time: OS • services • sys config
 - Sys admins (root): IBM xCAT
- Deploy time: Bioinformatics software
 - Bioinformaticians (rootless): EasyBuild
- Runtime: Bioinformatics software
 - Users: "*modules*" (Lmod)



Dependency Management

- Runtime

- *environment modules / Lmod / other implementations*
 - Modifies environment
 - Analysis scripts
 - No hardcoded paths to software
 - No environment variables for software defined (only used)
 - Portable



Runtime DepMan: modules

- Lmod (Lua implementation of modules)
 - Texas Advanced Computing Center
 - <https://github.com/TACC/Lmod>
 - <http://lmod.readthedocs.org>



Runtime DepMan: modules

- Lmod (Lua implementation of modules)

```
$> module avail GATK
```

```
----- /apps/modules/ -----  
GATK/2.7-4-g6f46d11  
GATK/2.8-1-g932cd3a
```

```
$> module load GATK/2.7-4-g6f46d11
```

```
$> module list
```

```
Currently Loaded Modulefiles:
```

```
1) /jdk/1.7.0_25      2) /R/3.0.2      3) /GATK/2.7-4-g6f46d11
```

Runtime DepMan: modules

```
$> module show GATK/2.7-4-g6f46d11
```

```
/apps/moduleless/GATK/2.7-4-g6f46d11:
```

```
module-what is   Sets GATK environment.
```

```
prereq           jdk/1.7.0_25
```

```
setenv           GATK_HOME /gcc//tools/GATK-2.7-4-g6f46d11/
```

```
$> java -jar ${GATK_HOME}/GenomeAnalysisTK.jar --version
```

```
GATK-2.7-4-g6f46d11
```



Deploytime DepMan: EasyBuild

- HPC UGent
 - hpcugent.github.io/easybuild/
- EasyBuild Framework (Python)
- EasyBlocks
 - Deploy pattern: ConfigureMake, MakeCp, Tarball
- EasyConfigs
 - Implementation of deploy pattern for
 - specific version of specific tool using specific toolchain

Deploytime DepMan: EasyBuild

- Toolchain example:
 - goolf-1.7.20 (GCC • OpenMPI • OpenBlas • LAPACK • FFTW)
- Install example:

```
$> Module load EasyBuild
```

```
$> eb BWA-0.7.12-goolf-1.7.20.eb
```



Deploytime DepMan: EasyBuild

- EasyBuild automates
 - Fetch sources
 - Decompress
 - Configure
 - Compile
 - Install
 - Generate module file
- No root access required
- Large collection of EasyConfigs shared by community

Deploymenttime DepMan: EasyBuild

- Successful deployment contains:
 - Deployed software
 - Lmod module file
 - EasyConfig used for this deployed software
 - Deployment log + test report

```
$> ls -l /apps/software/GATK/3.4-46-Java-1.7.0_80/easybuild/  
easybuild-GATK-3.4-46-20150805.155913.log  
easybuild-GATK-3.4-46-20150805.155913_test_report.md  
GATK-3.4-46-Java-1.7.0_80-easybuild-devel  
GATK-3.4-46-Java-1.7.0_80.eb
```



Deploymenttime DepMan: xCAT

- IBM Extreme Cloud Administration Toolkit (xCAT)
 - Discover the hardware servers
 - Execute remote system management
 - Provision operating systems on physical or virtual machines
 - Provision machines in Diskful (stateful) and Diskless (stateless)
 - Install and configure user applications
 - Parallel system management
 - Integrate xCAT in Cloud

Deploytime DepMan: xCAT

- Specific features designed to take advantage of (IBM) hardware including:
 - Remote Power Control
 - Remote POST/BIOS console
 - Serial over LAN functions
 - Hardware alerts and vitals provided via SNMP and email
 - Inventory and hardware management
- FOSS
 - www.xcat.org
 - <https://github.com/xcat2/xcat-core>