SEMs modules

- SEMS provides a common environment across workstations, Jenkins nodes, cee resources, and ascic machines.
- SEMS is now using spack(cm) to build the tpls and modules used by Trilinos and distribute them across the lab.
  - Spack-cm uses spack environments
    - reproducible builds of compiler toolchains on different platforms
  - Leverage spack community for
    - debugging
    - creating reasonable default package configurations
- Trilinos is ½ on the spack-cm toolchains.
  - Goal: move the rest over soon
SEMS modules hide complexity of the installations with lmod
Spack helps generate SEMS modules consistently

- Matches the “look and feel” from the old sems system
- Same process to generate modules for any spack environment by including the spack configuration
  - SEMS nfs resources
  - productions HPC machines
  - testbeds at sandia

```yaml
all:
  conflict:
    - "{name}"
  environment:
    set:
      "{name}_ROOT": "{prefix}"
      "{name}_VERSION": "{version}"
      "{name}_BIN": "{prefix.bin}"
      "{name}_INC": "{prefix.include}"
      "{name}_LIB": "{prefix.lib}"
  projections:
    all: "sems-{name}/{version}"
  verbose: true
```

```bash
setenv("HDF5_ROOT", "/projects/sems/install/rhel7-x86_64/sems/v2/tpl/hdf5/1.10.7/gcc/10.1.0/openmpi/4.0.5/mrkn5gg")
setenv("HDF5_VERSION", "1.10.7")
setenv("HDF5_BIN", "/projects/sems/install/rhel7-x86_64/sems/v2/tpl/hdf5/1.10.7/gcc/10.1.0/openmpi/4.0.5/mrkn5gg/bin")
setenv("HDF5_INC", "/projects/sems/install/rhel7-x86_64/sems/v2/tpl/hdf5/1.10.7/gcc/10.1.0/openmpi/4.0.5/mrkn5gg/include")
setenv("HDF5_LIB", "/projects/sems/install/rhel7-x86_64/sems/v2/tpl/hdf5/1.10.7/gcc/10.1.0/openmpi/4.0.5/mrkn5gg/lib")
```
What is spack-cm?

- The original goal of spack-cm was to create a tool that would use spack to replace the original sems install tools and give a familiar experience to SEMS TPL users.

- CM = configuration manager. How do we make modular reusable configurations for spack that will recreate the SEMS module experience?

- As spack adds features/resolves bugs spack-cm gets smaller!

  **spack-cm complexity vs spack release**

- Currently a collection of templates used to make spack.yaml files and a script to clean spack state before install.

- All project specific configuration (ie SEMS, or HAAPs) is kept in a separate repo and is usable by vanilla spack.

- Spack-cm is barely a project anymore 😊
Next: SEMS + spack + containers

- Targeting delivery of SEMS spack(cm)-built modules in containers
- Currently able to use a container with SEMS modules installed on it to build trilinos on
  - rhel8 (podman)
  - my MacBook(docker)
  - testbeds(podman).
- Looking for friendly users to play with containers and provide feedback
Live Demo
Obviously Live Demos don’t ever work...

```
ifrye@srrh8ciyd01[~]$: podman --version
podman version 4.1.1
ifrye@srrh8ciyd01[~]$: which podman
/usr/bin/podman
ifrye@srrh8ciyd01[~]$: module avail
module avail is not possible. MODULEPATH is not set or not set with valid paths.
```

```
ifrye@srrh8ciyd01[~]$: podman run -it cee-gitlab.sandia.gov:4567/sems/containers/docker/rhel8/spack-gcc8.5-ompi4.1.1-sems-tpls
[root@d24579b8bd15 ~]#
```

```
[root@9808415f1779 ~]# module avail

--------- /spack/share/spack/lmod/linux-rhel8-x86_64/openmpi/4.1.1-ue2lbi6/gcc/8.5.0 ---------
sems-cgns/4.2.0          sems-netcdf-cxx/4.2          sems-parmetis/4.0.3
sems-hdf5/1.10.7         sems-netcdf-fortran/4.5.3     sems-scotch/6.0.3
sems-netcdf-c/4.8.1      sems-parallel-netcdf/1.12.2    sems-superlu-dist/7.1.1

---------------------------------------- /spack/share/spack/lmod/linux-rhel8-x86_64/gcc/8.5.0 ----------------------------------------
sems-boost/1.70.0        sems-ninja/1.10.2            sems-vtest/1.2.0
sems-cmake/3.21.4        sems-openblas/0.3.18          sems-yaml-cpp/0.6.2
sems-gdb/9.2             sems-openmpi/4.1.1 (L)          sems-zlib/1.2.11
sems-git/2.31.1          sems-suite-sparse/5.8.1         sems-
sems-metis/5.1.0         sems-superlu/5.3.0
```

Obviously Live Demos don’t ever work...

```
[root@9808415f1779 /]# module avail

-------- /spack/share/spack/lmod/linux-rhel8-x86_64/openmpi/4.1.1-ue2lb6i/gcc/8.5.0
sems-cgns/4.2.0    sems-netcdf-cxx/4.2    sems-parmetis/4.0.3
sems-hdf5/1.10.7   sems-netcdf-fortran/4.5.3  sems-scotch/6.0.3
sems-netcdf-c/4.8.1 sems-parallel-netcdf/1.12.2 sems-superlu-dist/7.1.1

-------- /spack/share/spack/lmod/linux-rhel8-x86_64/gcc/8.5.0
sems-boost/1.78.0   sems-ninja/1.10.2      sems-vtest/1.2.0
sems-cmake/3.21.4   sems-openblas/0.3.18    sems-yaml-cpp/0.6.2
sems-gdb/9.2        sems-openmpi/4.1.1 (L)  sems-zlib/1.2.11
sems-git/2.31.1     sems-suite-sparse/5.8.1
sems-metis/5.1.0    sems-superlu/5.3.0

[root@9808415f1779 /]# module load sems-openmpi/4.1.1
[root@9808415f1779 /]# mpicc --version
gcc (GCC) 8.5.0 20210514 (Red Hat 8.5.0-4)
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This is free software; see the source for copying conditions. There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

[root@9808415f1779 /]# which mpicc
/spack/opt/spack/linux-rhel8-x86_64/gcc-8.5.0/openmpi-4.1.1-ue2lb6i-preqajjqdzhoknzxxwzgwzg/7g/bin/mpicc
```

```
[root@9808415f1779 /]# git clone https://github.com/trilinos/Trilinos.git
Cloning into 'Trilinos'...
remote: Enumerating objects: 1224372, done.
remote: Counting objects: 100% (1079/1079), done.
remote: Compressing objects: 100% (664/664), done.
remote: Total 1224372 (delta 490), reused 947 (delta 407), pack-reused 1223293
Receiving objects: 100% (1224372/1224372), 752.14 MiB | 16.29 MiB/s, done.
Resolving deltas: 100% (927036/927036), done.
Updating files: 100% (52599/52599), done.
```