Third Party Libraries

Things to keep in mind for modeling systems targeted for operations

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Motivation

- Third party libraries are powerful tools that make our software packages better.
- With the growth of community development paradigms, the numerical community has seen an explosion in the growth of third party libraries.
- Acceptable third party libraries have had different meanings in research and operational environments.
- Many transition to operations activities have been slowed or stopped as they have modeling systems that depend on libraries that are not available on operational platforms.
- This talk is to help developers understand “operational concerns” when trying to determine which libraries to use.
Concerns from an operational point of view

- **Support**
  - Modeling systems stay in operations a lot longer than in the research world, so this is a critical issue
  - How well supported is this library?
  - Does it have a community that can support it if main developer(s) move on?
  - Are there regular updates that keep up with changes in compiler/language standards?
  - Is there someone to reach out to in case of issues?

- **License**
  - Critical to have an acceptable license to use
  - All libraries installed on operational platform are available for all modeling systems to use
  - Restricted libraries are not practical
  - Use granted for research is not the same as use granted for operations
  - Many cases need written confirmation from license developers for operational use case
Concerns (contd.)

- **Security vulnerabilities**
  - Major concern for highly secure (FISMA HIGH) computing platforms
  - Packages listed under Federal database of insecure software (https://cve.mitre.org/) are rejected
  - Libraries have to be reviewed by security division at NCO to confirm that they will not impact operations
  - Installation packages need to be self contained, and should not be reaching out to unapproved websites to download packages
  - Underlying packages that a library depends upon should be clearly stated and those libraries also have to go through the approval process

- **Duplications**
  - Does an existing available library meet the needs?
  - Can new libraries deprecate existing libraries?
Final Thoughts

- **Third party libraries are critical** for software development, and we should take advantage of their availability.
- **Adding libraries do not come without cost**, and they can make packages harder to port. When deciding on adding library dependencies, think about:
  - Long term support and development
  - Is a similar capability already available
  - Will the license be a problem in the long term
  - Will this be supportable in operations
- **Switch the order** in which we add library dependencies
  - First determine if this will work in operations before adding the dependency to your software
- **Library consolidation/refactoring** should be an ongoing process. Reducing the number of library dependencies saves resources.