Improvements on BioDynaMo build system

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WHAT?

BIOdynamAmo
Biology Dynamics Modeller

Written in C++14
17000+ LoC (Lines of Code)
23+ External Dependencies
Available for 3 systems (MacOS, CentOS, Ubuntu)

a joint project between CERN and Newcastle University
WHAT?
GOAL

Improve the CMake build system of BioDynaMo
(a.k.a how to compile/install/test the entire project)
WHY?

1) We wanted a more robust and flexible procedure
   BioDynaMo was not built for just Computer Scientists!

2) We wanted a more maintainable codebase
   The original procedure was convoluted
WHERE DO I START?
OLD BUILD SYSTEM

1. ./install.sh
2. Install prerequisites for the given OS
3. Download custom libraries (ROOT, ParaView, Qt)
4. CERN Storage service
5. cmake ..
6. Check if requirements are fulfilled
7. make -j 4
8. Install in a custom directory
CRITICAL POINTS

1. ./install.sh
2. Install prerequisites for the given OS
3. Download custom libraries (ROOT, ParaView, Qt)
4. CERN Storage service
5. cmake ..
6. Check if requirements are fulfilled
7. make -j 4
8. Install in a custom directory
SHORTCOMINGS

Convoluted code and install logic.
The user could not choose which prerequisites to install.
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Improvements:
New user-friendly install procedure (/prerequisites.sh all).
Unified download procedure within CMake.
Some requirements (packages versions, if installed, etc.) were not checked. Hard-coded packages configurations (not portable). This caused compilation errors.
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Improvements:
Better package detection process (CMake based).
Support for different compilers and libraries (gcc, cc, clang, etc.).
Automatic feature disabling mechanisms.
OTHER IMPROVEMENTS

Before

1. Convoluted procedure to add a new OS.
2. Few user diagnostic messages.
3. No summary of installed/detected features.
4. make install needed to use BioDynaMo.
5. Many more...

After

1. Easily extendable to support other OSes.
2. Improved user messages and warnings.
4. Install step is not required to use the library.
5. Many more...
NEW BUILD SYSTEM

1. ./install.sh
2. Install prerequisites for the given OS
3. cmake ../
4. Check if requirements are fulfilled
5. make -j 4
6. (Optional) Install in a custom directory
7. Download custom libraries (ROOT, ParaView, Qt)
8. CERN Storage service
MY CONTRIBUTIONS

1) New flexible and robust automatic build procedure
   Major codebase refactor.
   Available on 4 major OS (MacOS, CentOS 7, Ubuntu 16.04/18.04).

2) Extensively tested and validated
   The procedure was built with the user in mind.

3) Better documentation and user guides
   Detailed instructions for all the supported OSes with code examples.
FUTURE WORK

1. Automate the build process even more!
Add BioDynaMo to package repositories (apt, yum, brew, etc.).

2. Extend support for other OSes
Add support for Windows, CentOS 6.5, etc.
THANK YOU!

QUESTIONS?

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