Eigen on HPC

What is Eigen?

Eigen is a C++ template library for linear algebra: matrices, vectors, numerical solvers, and related algorithms. It contains various classes that help to facilitate easy and simple matrix operations and geometry features. The API is incredibly friendly and intuitive for C++ users.

Links:

Official Website

Documentation

Versions Available:

The following versions are available on the cluster:

- eigen/eigen3.4.0

How to load Eigen?

To load Eigen, use the following commands:

```
#Load the Eigen module
module load eigen/eigen3.4
```

To verify if the module and dependencies are loaded correctly, use the following command.

```
#Show all the modules loaded
module list
```

This should list all the software and dependencies that are loaded. In this case, only Eigen will be loaded since this is standalone library.

If a specific GCC compiler is needed with the Eigen library, users can load any available GCC compiler.

```
# To see all available GCC compiler use
module avail compilers/gcc
```

How to use Eigen?

For this tutorial, use the following C++ code as reference to use the eigen library,

```
#include <iostream>
#include <Eigen/Dense>

using Eigen::MatrixXd;
using Eigen::VectorXd;

int main()
{
  MatrixXd m = MatrixXd::Random(3,3);
  m = (m + MatrixXd::Constant(3,3,1.2)) * 50;
  std::cout << "m =" << std::endl << m << std::endl;
  VectorXd v(3);
  v << 1, 2, 3;
  std::cout << "m * v =" << std::endl << m * v << std::endl;

}
```

This code performs simple matrix multiplication.

Create a test.cpp file and paste the following code.

Use the following command to compile,

```
#Compile the program
g++ test.cpp -o test.out
```

The executable should be compiled and linked with the Eigen library automatically. You do not need to specify the path to eigen library.

Where to find help?

If you are stuck on some part or need help at any point, please contact OIT at the following address.

https://ua-app01.ua.edu/researchComputingPortal/public/oitHelp