A Brief ROOT Tutorial

“...the insane root
That takes the reason prisoner.”

- Shakespeare

Michael Betancourt
Massachusetts Institute of Technology
NEPPSR 2009
What is ROOT?
What is ROOT?

- NOT a program
What is ROOT?

- NOT a program
- NOT a command line interpreter
What is ROOT?

- NOT a program
- NOT a command line interpreter
- A collection of C++ classes
What is CINT?

- CINT is a dynamic C++ interpreter, in other words it allows one to run C++ code without having to compile it.
What is CINT?

- CINT is a dynamic C++ interpreter, in other words it allows one to run C++ code without having to compile it.

- Advantages: Quick prototyping and testing.
What is CINT?

- CINT is a dynamic C++ interpreter, in other words it allows one to run C++ code without having to compile it

- Advantages: Quick prototyping and testing

- Disadvantages: Slow, awkward properties, limited support outside of ROOT classes
Some Quick Notes on C++

- Common mistake: trying to learn “ROOT” without first learning basic C/C++
Pointers

Variable \& Pointer

Value \& Address

*
double variable = 10;
double *pointer = &variable;

variable = 10
pointer = &variable = 0x482a8e94
*pointer = variable = 10
class meal
{

    public:

    meal(unsigned int nServings);
    ~meal();

    addIngredient(ingredient newIngredient);
    prepareMeal();
    serveMeal();

    private:

    unsigned int mNumInIngredients;
    vector<ingredients> mIngredients;

};
meal chickenPipian(2);
chickenPipian.addIngredient(tomatillos);
...
chickenPipian.addIngredient(salt);
chickenPipian.prepareMeal();
chickenPipian.serveMeal();
meal *chickenPipian = new meal(2);
(*chickenPipian).prepareMeal();
chickenPipian->prepareMeal();
delete chickenPipian;
References

- Bjarne Stroustrup, *The C++ Programming Language*
- Steve Oualline, *Practical C++ Programming*
- Scott Meyers, *Effective C++*
- [http://cplusplus.com](http://cplusplus.com)
TFile inputFile("input.root", "read");

inputFile.ls();

TFile outputFile("output.root", "recreate");

outputFile.Write();
outputFile.Close();
Common ROOT Classes

```cpp
TTree t("treeName", "Tree Title");
t.Branch("varName", varAddress, "varName/D");
t.Fill();
t.Write();

TTree *t = (TTree*)f.Get("treeName");
t->Print();

  t->SetBranchAddress("varName", varAddress);
t->GetEntry(n);```

A Brief ROOT Tutorial
TH1F histogram("histName", "Hist Title", 100, 0, 50);
histogram.Sumw2();

histogram.Fill(variable);

histogram.Draw();
References

- ROOT Class Browser
  - \texttt{http://root.cern.ch/root/html522/}
  - \texttt{http://root.cern.ch/root/html522/TTree.html}
- ROOT Users’ Guide
  - \texttt{http://root.cern.ch/drupal/content/users-guide}
One Last Note

- PyRoot
  - [http://root.cern.ch/root/HowtoPyROOT.html](http://root.cern.ch/root/HowtoPyROOT.html)