“计算”介绍

Linux操作系统

Ubuntu

Fortran，C++简介

Euler法 示例

CERN ROOT数据处理软件

Histogram, bin, error-bar

Pi计算示例

GNUPLOT作图

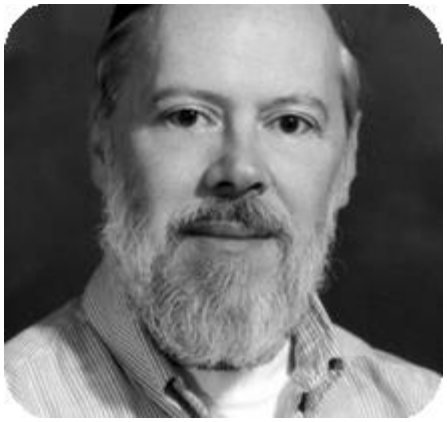
动态图示例

并行计算

版本维护

Linux之前

1983 图灵奖:
Ken Thompson， Dennis M. Ritchie
for their development of generic operating systems theory and specifically for the implementation of the UNIX operating system.



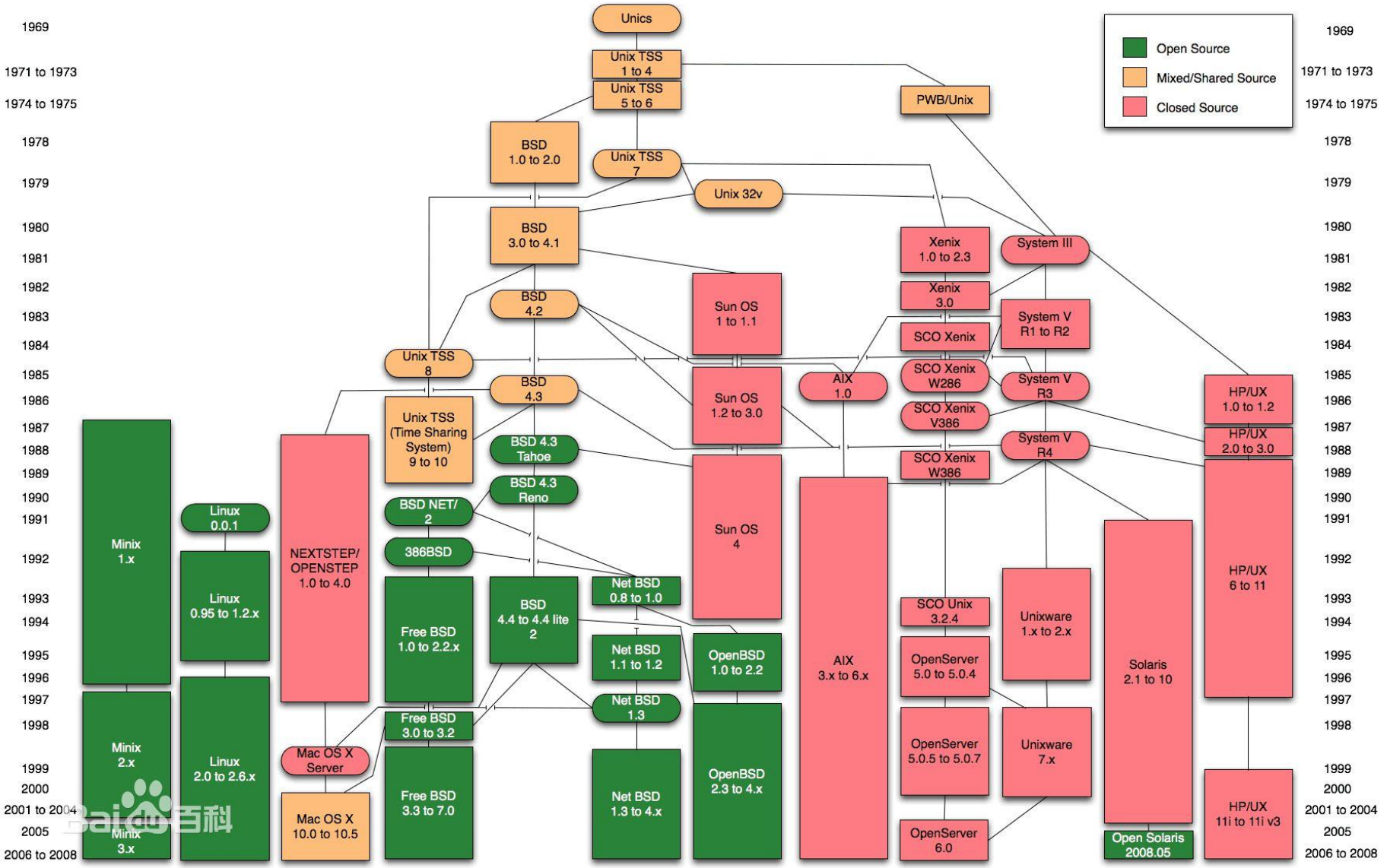
- In 80's, Microsoft's DOS (disk operating system) was the dominated OS for PC
- Apple MAC was better, but expensive
- UNIX was much better, but much, much more expensive. Only for minicomputer for commercial applications
- **People was looking for a UNIX based system, which is cheaper and can run on PC**
- Both DOS, MAC and UNIX were proprietary, i.e., the source code of their kernel is protected
- No modification is possible without paying high license fees

GNU Linux

GNU是“GNU is Not Unix”的递归缩写。

- Established in 1984 by Richard Stallman, who believes that software should be free from restrictions against copying or modification in order to make better and efficient computer programs
- GNU通用公共许可证（GNU General Public License，GPL）。即“反版权”（或称Copyleft）概念。

1991年Linus Torvalds编写出了与UNIX兼容的Linux操作系统内核并在GPL条款下发布。Linux之后在网上广泛流传，许多程序员参与了开发与修改。1992年Linux与其他GNU软件结合，完全自由的操作系统正式诞生。该操作系统往往被称为“GNU/Linux”或简称Linux。


1969
1971 to 1973
1974 to 1975
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1995
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2000
2001 to 2004
2005
2006 to 2008
Open Source
Mixed/Shared Source
Closed Source
Unics
Unix TSS 1 to 4
Unix TSS 5 to 6
PWB/Unix
BSD 1.0 to 2.0
Unix TSS 7
Unix 32v
BSD 3.0 to 4.1
Xenix 1.0 to 2.3
System III
Xenix 3.0
BSD 4.2
Sun OS 1 to 1.1
System V R1 to R2
SCO Xenix
Unix TSS 8
SCO Xenix W286
AIX 1.0
System V R3
HP/UX 1.0 to 1.2
BSD 4.3
Unix TSS (Time Sharing System) 9 to 10
Sun OS 1.2 to 3.0
SCO Xenix V386
HP/UX 2.0 to 3.0
BSD 4.3 Tahoe
System V R4
SCO Xenix W386
BSD 4.3 Reno
Minix 1.x
Linux 0.0.1
BSD NET/ 2
Sun OS 4
NEXTSTEP/ OPENSTEP 1.0 to 4.0
386BSD
AIX 3.x to 6.x
Solaris 2.1 to 10
HP/UX 6 to 11
Net BSD 0.8 to 1.0
SCO Unix 3.2.4
Unixware 1.x to 2.x
Linux 0.95 to 1.2.x
Free BSD 1.0 to 2.2.x
BSD 4.4 to 4.4 lite 2
Net BSD 1.1 to 1.2
OpenBSD 1.0 to 2.2
OpenServer 5.0 to 5.0.4
Minix 2.x
Net BSD 1.3
OpenServer 5.0.5 to 5.0.7
Unixware 7.x
Linux 2.0 to 2.6.x
Free BSD 3.0 to 3.2
Mac OS X Server
OpenBSD 2.3 to 4.x
Free BSD 3.3 to 7.0
Net BSD 1.3 to 4.x
Mac OS X 10.0 to 10.5
OpenServer 6.0
Open Solaris 2008.05
HP/UX 11i to 11i v3
Minix 3.x

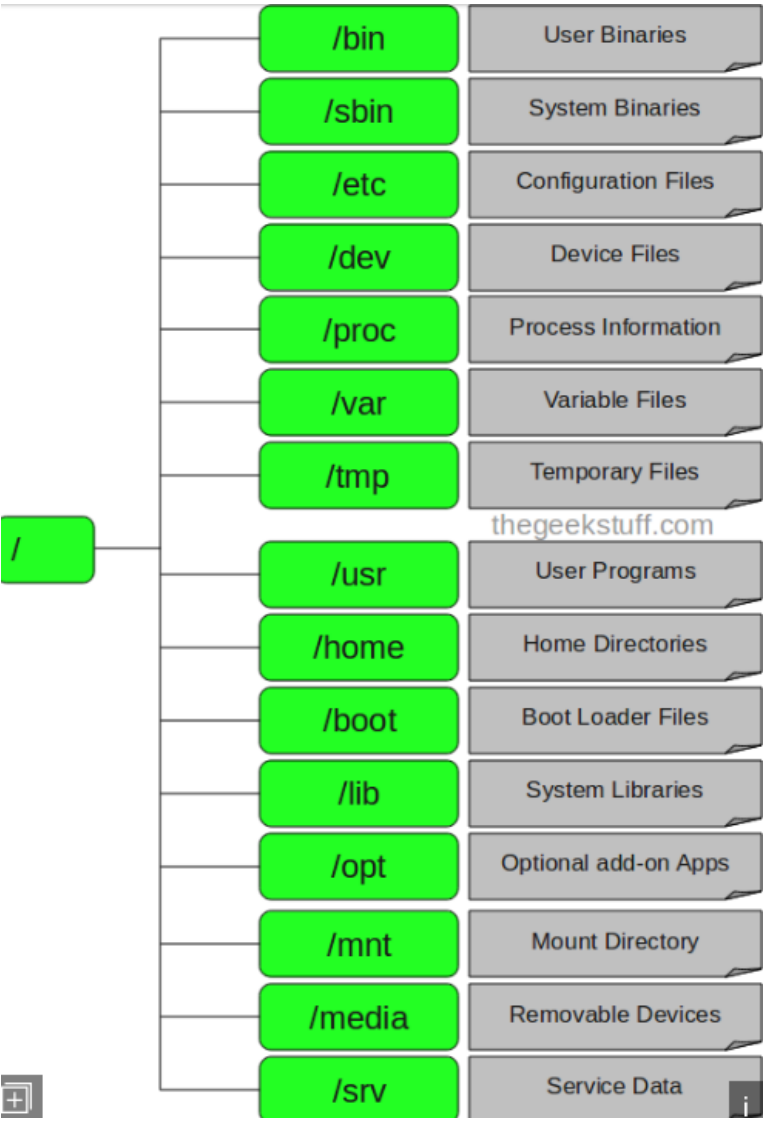
Linux系统

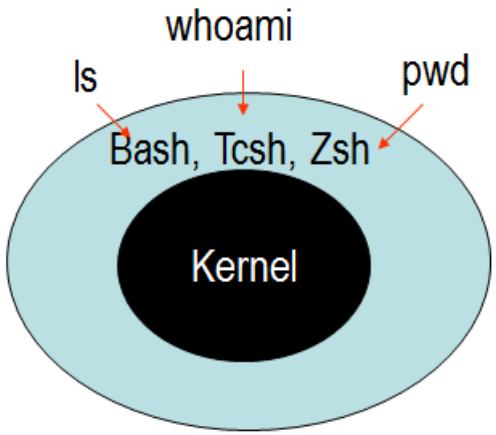
Arch Linux, CentOS, Debian, Fedora, Gentoo Linux, Linux Mint, Mageia, openSUSE and Ubuntu, together with commercial distributions such as Red Hat Enterprise Linux and SUSE Linux Enterprise Server.

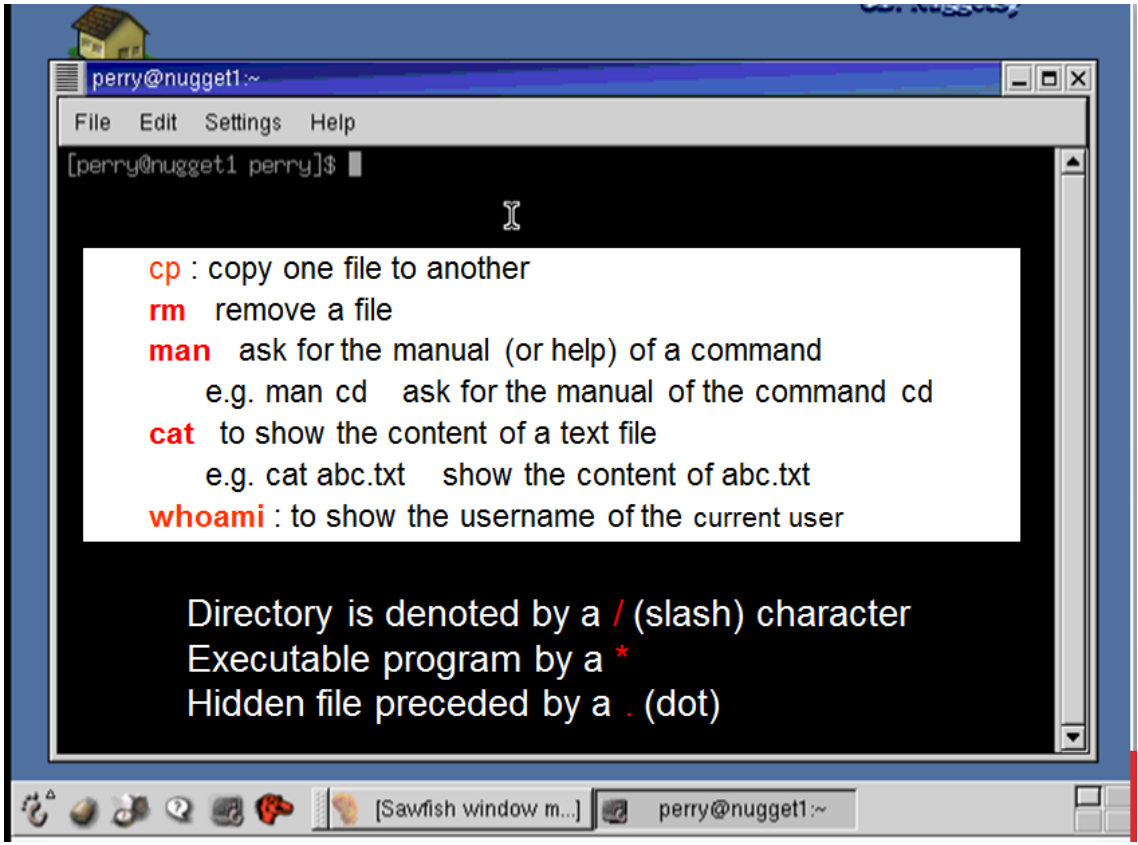
Statistics about the Linux distributions

Name	Machine
Ubuntu	39,276
Debian GNU/Linux	26,936
Fedora	10,079
Slackware Linux	9,764
SuSE Linux	9,393
Gentoo Linux	7,413
Arch Linux	4,744
CentOS	4,740
Red Hat Linux	4,672
Kubuntu	2,713
Mandrake	2,645
Mandriva	2,385
Linux Mint	2,248
unknown	2,175
openSUSE	1,750

Linux Shell以及文件系统







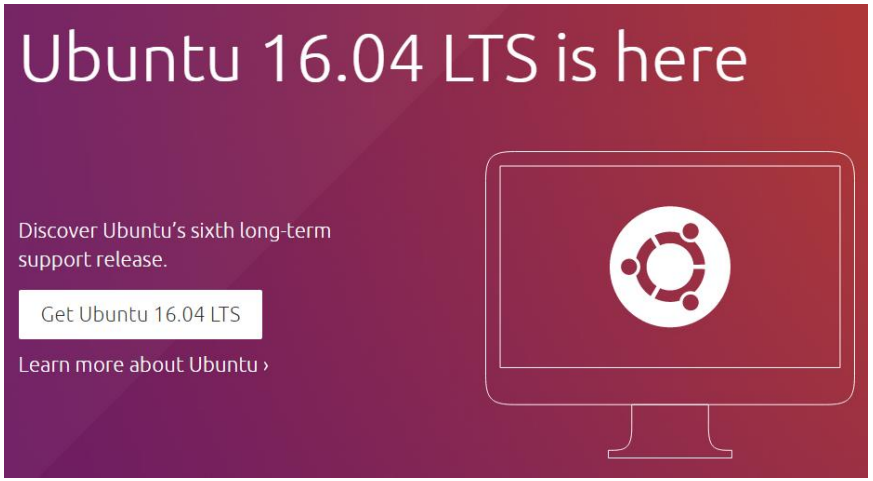
Ubuntu

Ubuntu是一个以桌面应用为主的开源GNU/Linux操作系统，Ubuntu 是基于Debian GNU/Linux，支持x86、amd64（即x64）和ppc架构，由全球化的专业开发团队（Canonical Ltd）打造的

Ubuntu历史版本一览表

版本号	代号	发布时间
17.04	Zesty Zapus	2017/04(即将发布)
16.10	Yakkety Yak	2016/10/20
16.04LTS	Xenial Xerus	2016/04/21
15.10	Wily Werewolf	2015/10/23
15.04	Vivid Vervet	2015/4/22
14.10	Utopic Unicorn	2014/10/23
14.04 LTS	Trusty Tahr	2014/04/18
13.10	Saucy Salamander	2013/10/17
13.04	Raring Ringtail	2013/04/25
12.10	Quantal Quetzal	2012/10/18
12.04 LTS	Precise Pangolin	2012/04/26
11.10	Oneiric Ocelot	2011/10/13
11.04（Unity成为默认桌面环境）	Natty Narwhal	2011/04/28
10.10	Maverick Meerkat	2010/10/10
10.04 LTS	Lucid Lynx	2010/04/29
9.10	Karmic Koala	2009/10/29
9.04	Jaunty Jackalope	2009/04/23
8.10	Intrepid Ibex	2008/10/30
8.04 LTS	Hardy Heron	2008/04/24
7.10	Gutsy Gibbon	2007/10/18
7.04	Feisty Fawn	2007/04/19
6.10	Edgy Eft	2006/10/26
6.06 LTS	Dapper Drake	2006/06/01
5.10	Breezy Badger	2005/10/13
5.04	Hoary Hedgehog	2005/04/08
4.10（初始发布版本）	Warty Warthog	2004/10/20

Arguably *the* most user-friendly version of Linux.
Huge repository of (free) software available - by far the most of any Linux distro



可与Windows双系统安装;可硬盘，U盘，光盘安装; 安装过程很自动

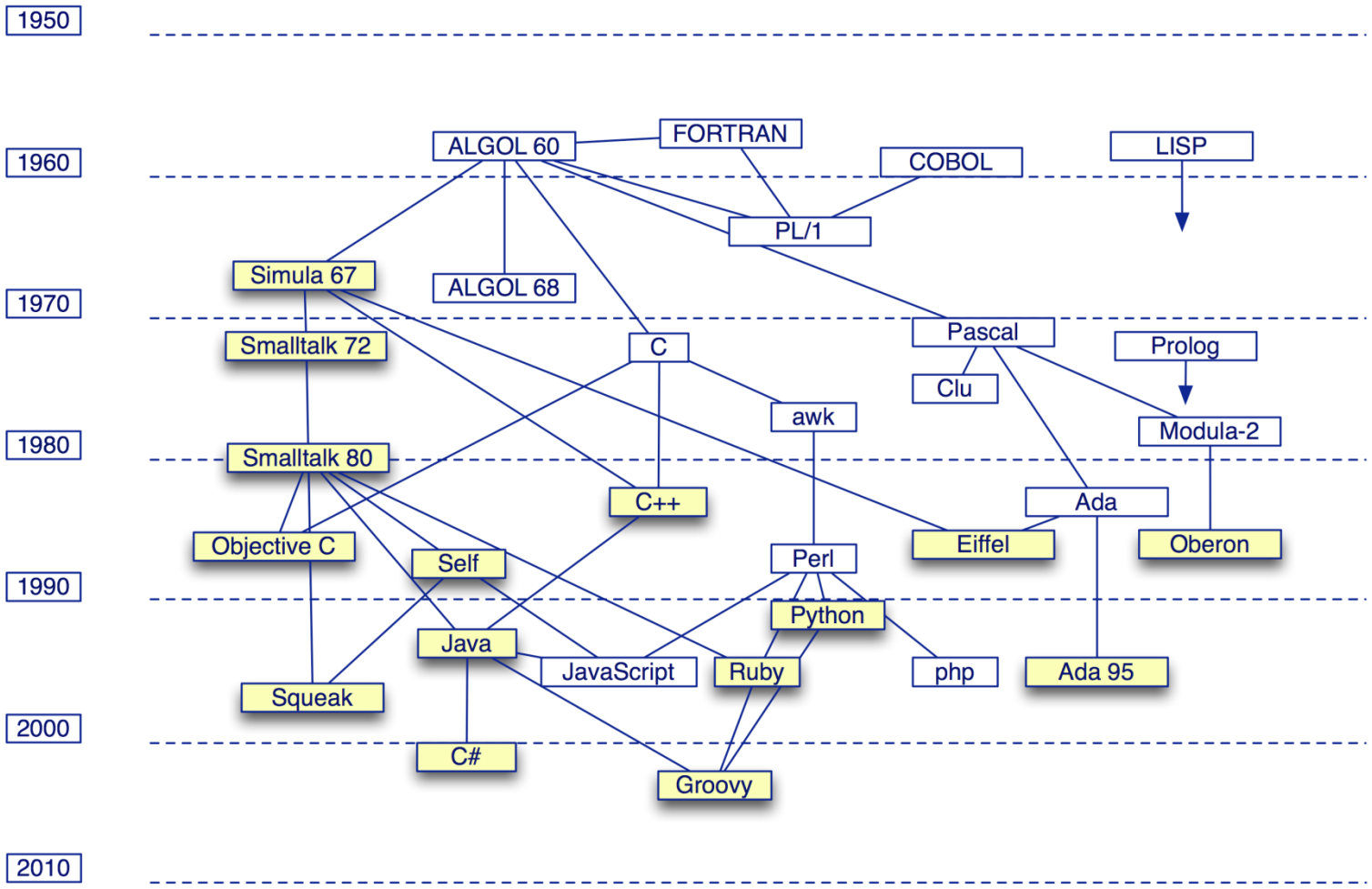
安装编译环境

sudo apt-get install build-essential

gcc, g++,....

sudo apt-get install gfortran

Object-oriented language genealogy



1979年， Bjarne Stroustrup到了Bell实验室，开始从事将C改良为带类的C（*C with classes*）的工作。1983年该语言被正式命名为C++。

Simula is considered the first object-oriented programming language. As its name suggests, Simula was designed for doing simulations, and the needs of that domain provided the framework for many of the features of object-oriented languages today.

Simula

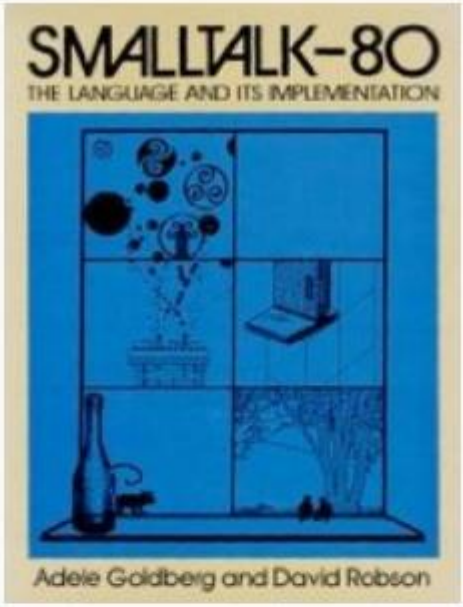
Paradigm	Object-oriented
Designed by	Ole-Johan Dahl, Kristen Nygaard
First appeared	1965
Influenced by	
	ALGOL 60
Influenced	
	Object-oriented programming languages

ALAN KAY

United States – 2003

CITATION

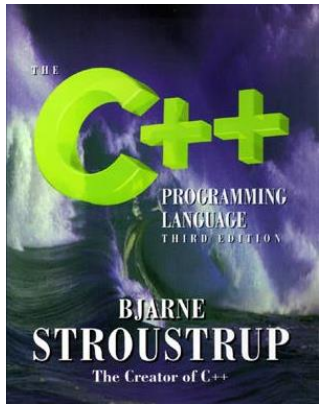
For pioneering many of the ideas at the root of contemporary object-oriented programming languages, leading the team that developed Smalltalk, and for fundamental contributions to personal computing.



Paradigm	Object-oriented
Designed by	Alan Kay, Dan Ingalls, Adele Goldberg
Developer	Alan Kay, Dan Ingalls, Adele Goldberg, Ted Kaehler, Diana Merry, Scott Wallace, Peter Deutsch and Xerox PARC
First appeared	1972; 46 years ago (development began in 1969)
Stable release	Smalltalk-80 version 2 / 1980; 38 years ago

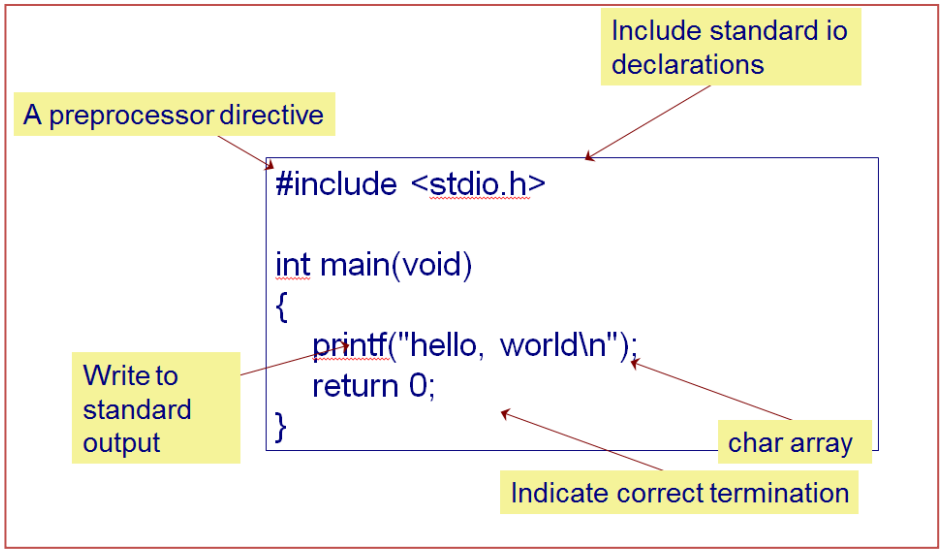
C++简介

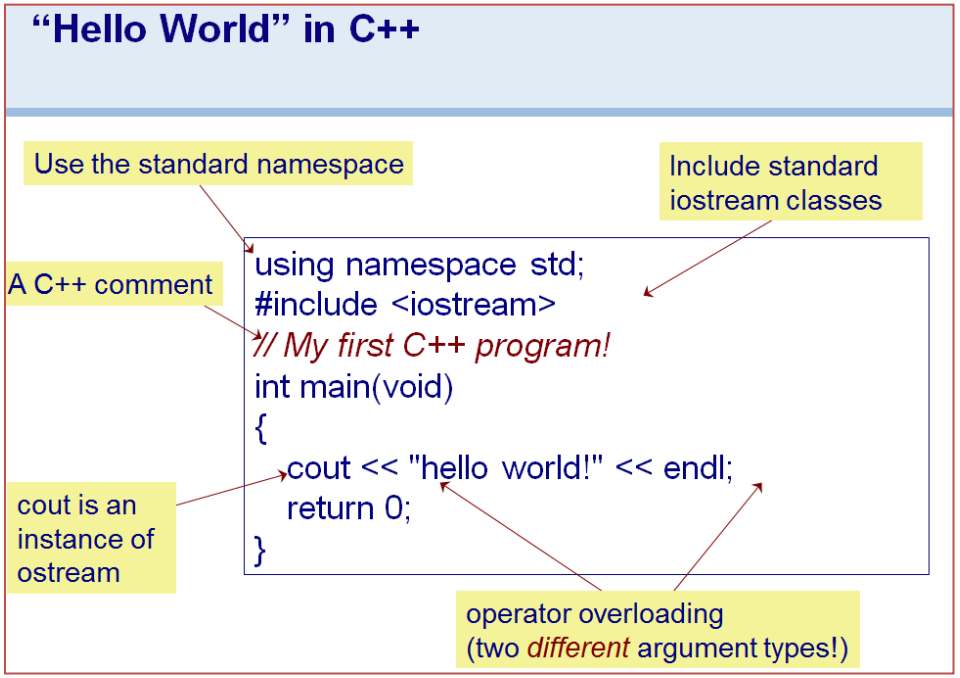
A *"better C"* that supports:
- Systems programming
- Object-oriented programming (*classes* & *inheritance*)
- Programming-in-the-large (*namespaces*, *exceptions*)
- Generic programming (*templates*)
- Reuse (large class & template libraries)



Most C programs are also C++ programs.

gcc hello.c –o hello





编译：Use gcc, Visual Studio, etc.
File types：.cc, .cp, .cpp, .CPP, .cxx, .c++, .C , .h, .H

```
1  // Fig. 18.3: fig18_03.cpp
2  // Using an inline function to calculate the volume of a cube.
3  #include <iostream>
4  using std::cout;
5  using std::cin;
6  using std::endl;
7
8  // Definition of inline function cube. Definition of function appears
9  // before function is called, so a function prototype is not required.
10 // First line of function definition acts as the prototype.
11 inline double cube( const double side )
12 {
13    return side * side * side; // calculate the cube of side
14 } // end function cube
15
16 int main()
17 {
18    double sideValue; // stores value entered by user
19
20    for ( int i = 1; i <= 3; i++ )
21    {
22       cout << "\nEnter the side length of your cube: ";
23       cin >> sideValue; // read value from user
24
25       // calculate cube of sideValue and display result
26       cout << "Volume of cube with side "
27          << sideValue << " is " << cube( sideValue ) << endl;
28    }
29
30    return 0; // indicates successful termination
31 } // end main
```

using avoids repeating std::

inline qualifier

Complete function definition so the compiler knows how to expand a cube function call into its inlined code.

cube function call that could be inlined

```
Enter the side length of your cube: 1.0
Volume of cube with side 1 is 1

Enter the side length of your cube: 2.3
Volume of cube with side 2.3 is 12.167
```

Fortran

JOHN BACKUS 1977图灵奖

United States – 1977

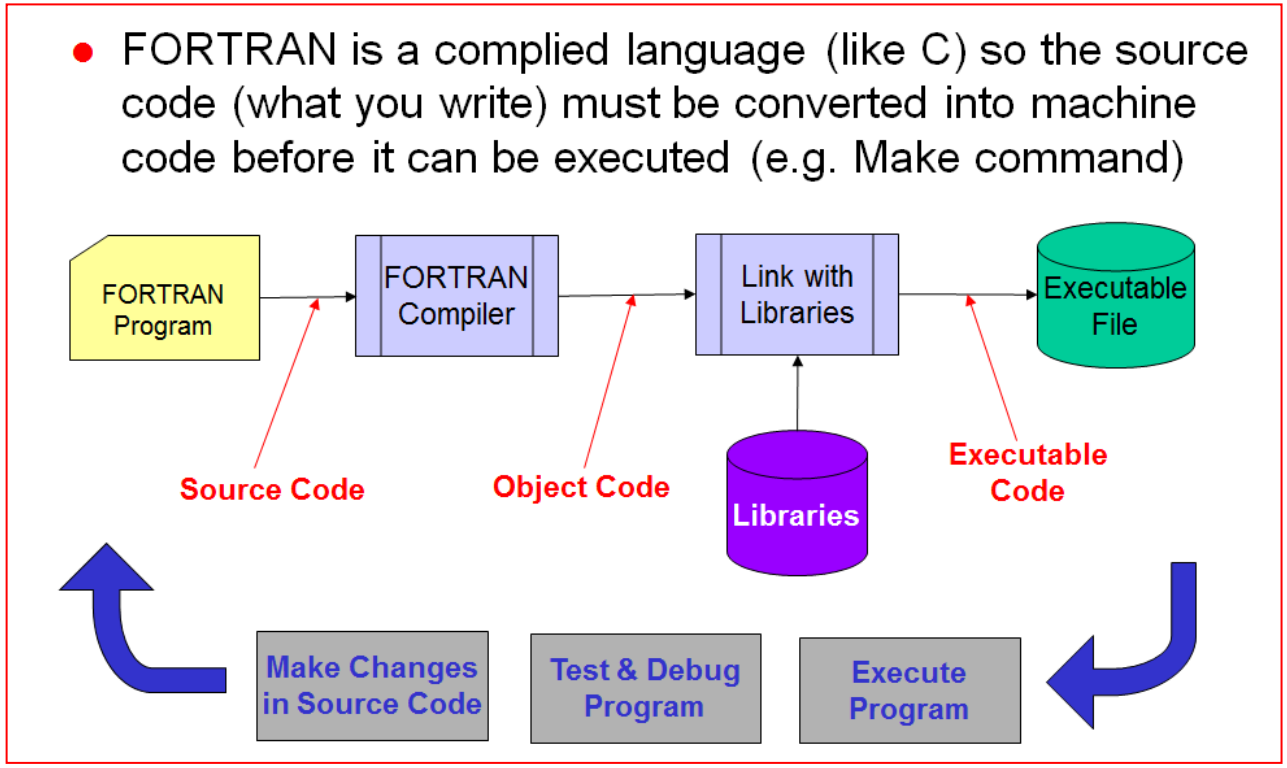
CITATION

For profound, influential, and lasting contributions to the design of practical high-level programming systems, notably through his work on FORTRAN, and for seminal publication of formal procedures for the specification of programming languages.

- One of the oldest computer languages
  - created by John Backus and released in 1957
  - designed for scientific and engineering computations
- Version history
  - FORTRAN 1957
  - FORTRAN II
  - FORTRAN IV
  - FORTRAN 66 (released as ANSI standard in 1966)
  - FORTRAN 77 (ANSI standard in 1977)
  - FORTRAN 90 (ANSI standard in 1990)
  - FORTRAN 95 (ANSI standard version)
  - FORTRAN 2003 (ANSI standard version)

Fortran

- **FORTRAN was created to solve scientific and engineering problems**
- **Introduced integer and floating point variables**
- Introduced array data types for math computations
- Introduced subroutines and subfunctions
- There is a free compiler in Unix-Linux systems
  - f77, g77 - **g95, gfortran**



Fortran 结构

- Skeleton of a program…

```
      PROGRAM MAIN
      REAL KGLO,FORC,KEL
      COMMON /STIF/KGLO(100,100)/LOAD/FORC(100)/DEF/D(100)
C     ...read in data and initialize problem...
      DO 100 IELEM=1,NELEMS
C        ...assemble global stiffness matrix...
         CALL KELEM(IELEM,KEL)
         CALL ASMBK(IELEM,KEL)
100   CONTINUE
      DO 200 ILOAD=1,NLOADS
C        ...assemble load vector...
         CALL LODVEC(ILOAD,LOAD)
200   CONTINUE
      CALL CONSTR(KDOFS)
      CALL SOLVE(NDOFS)
C     ...print out results, etc. ...
      END
```

partial list of declarations

Calculate stiffness matrix, KEL, for a single element

Add KEL to global stiffness matrix, KGLO

Construct FORC from individual loads defined in LOAD array

Must constrain problem at specified DOF's (or no solution possible)

Compute solution for displacements

Python

- Open source general-purpose language.
- Object Oriented, Modular
- Easy to interface with C++/C/Java/Fortran
- Interactive environment
- Interpreted and therefore slower than compiled languages

Python is an interpreted high-level programming language for general-purpose programming. Created by Guido van Rossum and first released in 1991, Python has a design philosophy that emphasizes code readability, notably using significant whitespace. It provides constructs that enable clear programming on both small and large scales

斐波那契数列

```
def fib(n):
    a, b = 0, 1
    while a < n:
      print(a, end=' ')
      a, b = b, a+b
    print()
fib(1000)
```

```
$ python3.4 1.py
0 1 1 2 3 5 8 13 21 34 55 89 144 233 377 610 987
```

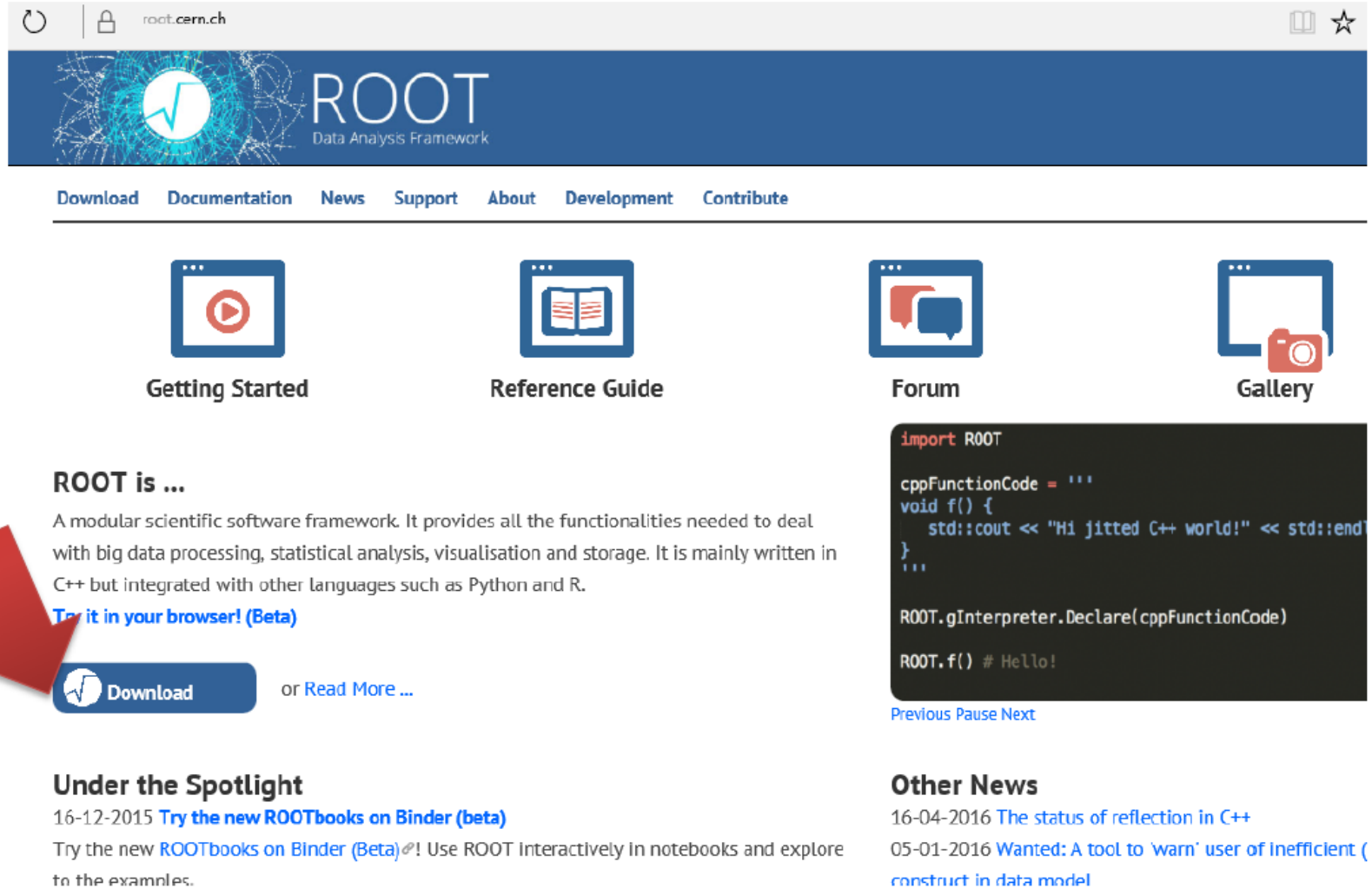
end=' '不换行是python3版本的用法，python2版本无法编译

CERN Root

欧洲核子中心(CERN)开发的大型科学数据处理软件

基于Cint(C/C++ interpreter, C-int)是一个C++解释器, 和GCC、VC等编译器不同,它是解释执行C++代码的

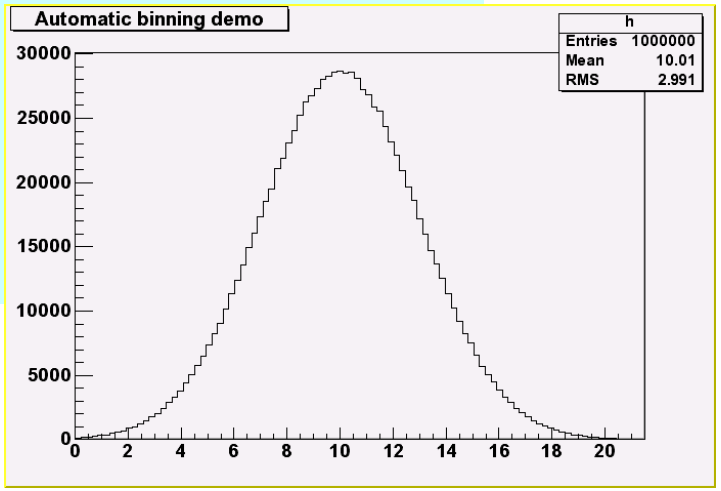
https://root.cern.ch/



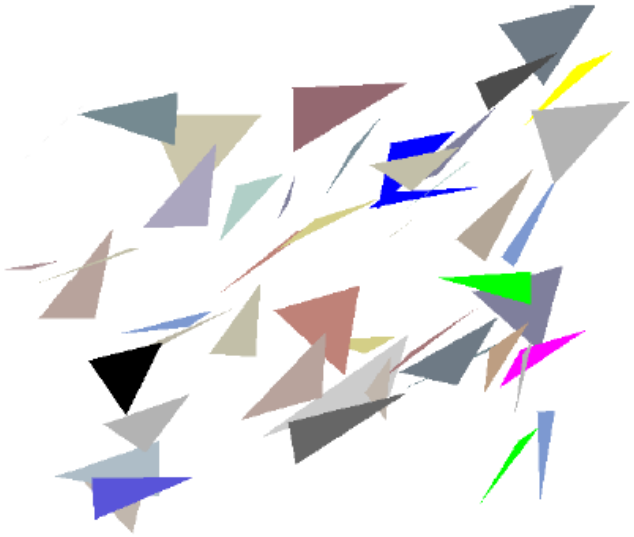
CERN Root: Histogram

Bin，Events，Mean，RMS

```
#include "TH1.h"
#include "TF1.h"

void demoauto() {
   TF1 *f1 = new TF1("f1","gaus",0,30);
   f1->SetParameters(1,10,3);
   TH1F *h = new TH1F("h","Automatic binning demo",100,0,20);
   for (Int_t i=0;i<1000000;i++) {
      h->Fill(f1->GetRandom());
   }
   h->Draw();
}
```



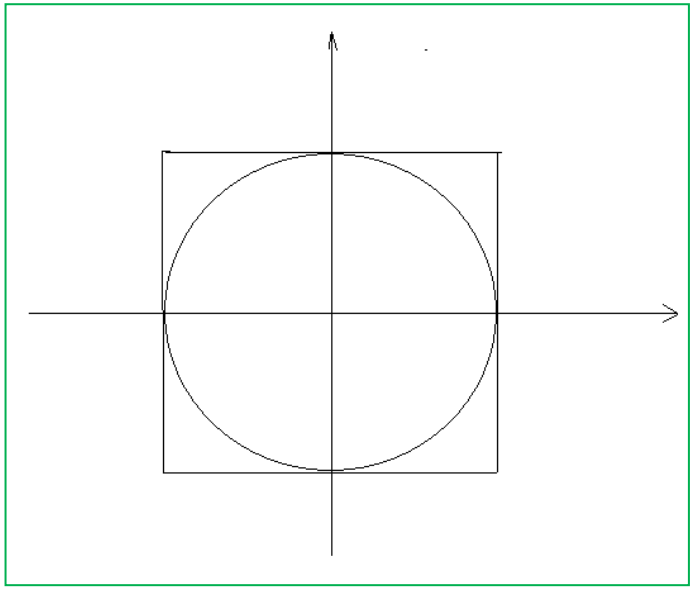
CERN Root 例1： 三角图形



```
TCanvas *c1 = new TCanvas("c1","triangles",10,10,700,700);
TRandom r;
Double_t dx = 0.2; Double_t dy = 0.2;
Int_t ncolors = gStyle->GetNumberOfColors();
Double_t x[4],y[4];
TColor *c;
Int_t ci;
for (Int_t i=0;i<ntriangles;i++) {
   x[0] = r.Uniform(.05,.95); y[0] = r.Uniform(.05,.95);
   x[1] = x[0] + dx*r.Rndm(); y[1] = y[0] + dy*r.Rndm();
   x[2] = x[1] - dx*r.Rndm(); y[2] = y[1] - dy*r.Rndm();
   x[3] = x[0];               y[3] = y[0];
   TPolyLine *pl = new TPolyLine(4,x,y);
   pl->SetUniqueID(i);
   ci = ncolors*r.Rndm();
   c  = gROOT->GetColor(ci);
   c->SetAlpha(r.Rndm());
   pl->SetFillColor(ci);
   pl->Draw("f");
}
c1->AddExec("ex","TriangleClicked()");
```

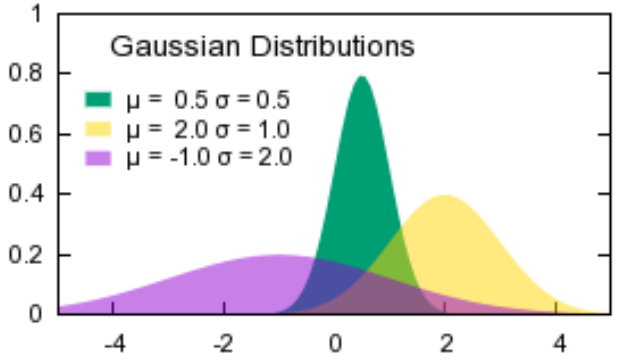
CERN Root例2： 随机数计算Pi

```
void random()
{
//TRandom3, is based on the "Mersenne
Twister generator", and is the recommended
one, since it has good random proprieties
(period of about 10**6000 ) and it is fast
      // create random number generator
      gRandom = new TRandom3(0);
      gRandom2 = new TRandom3(1);
      int n=20000;
      int ftot=0;
      for (int i = 0; i < n; ++i) {
        double x=gRandom->Uniform(-1,1);
        double y=gRandom2->Uniform(-1,1);
        double r=sqrt(x*x+y*y);
        if(r<1.0) {ftot++;}
      }

     cout<<4*float(ftot)/float(n)<<endl;

}
```



GNUPLOT

http://www.gnuplot.info/



gnuplot homepage

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Documentation
Demos
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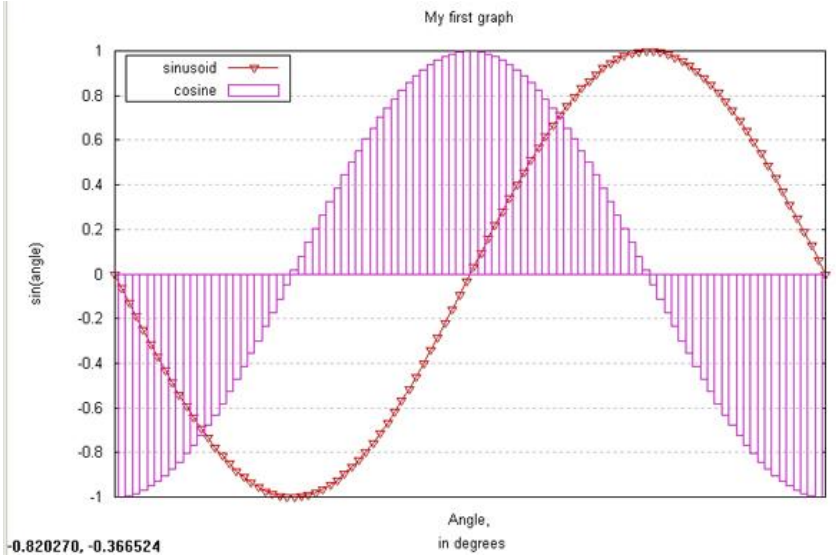
Contributed scripts
External Links
Tutorials, learning, and help
Books

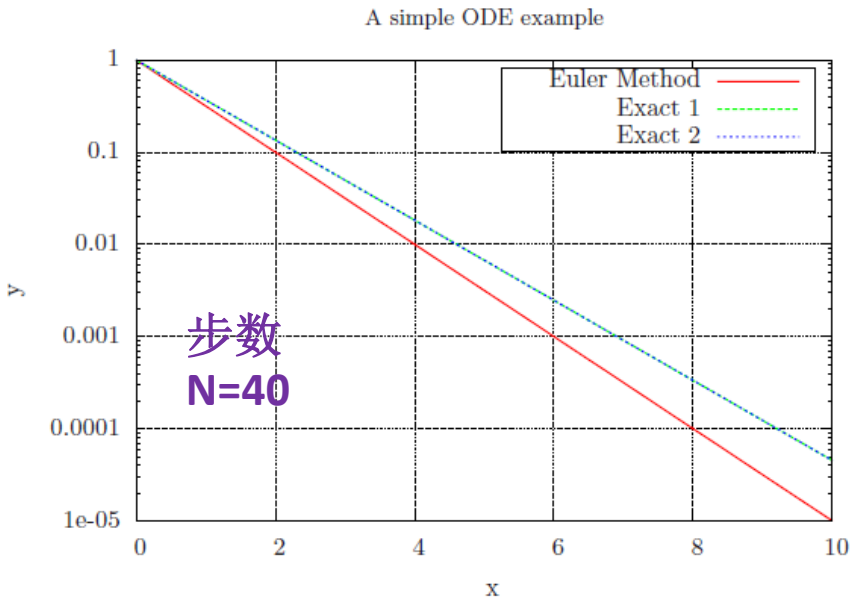
Gnuplot is a portable **command-line driven graphing utility** for Linux, OS/2, MS Windows, OSX, VMS, and many other platforms. The source code is copyrighted but freely distributed (i.e., you don't have to pay for it). It was **originally created to allow scientists and students to visualize** mathematical functions and data **interactively**, but has grown to support many non-interactive uses such as web scripting. It is also used as a plotting engine by third-party applications like Octave. Gnuplot has been supported and under active development since 1986.

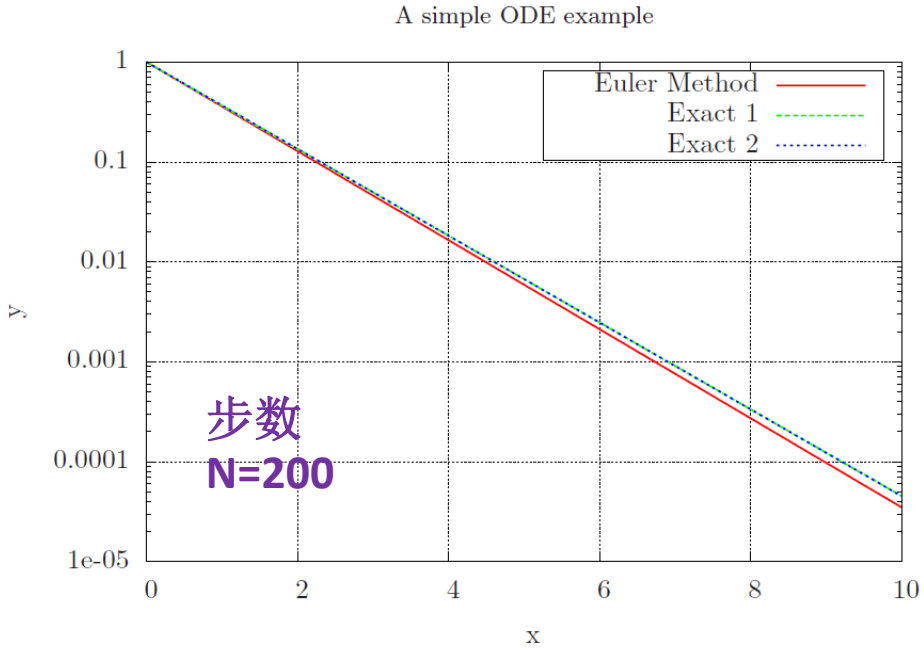


例： 常微分方程求解

An ODE Example: $y' = -y$,
with y(0)=1. x:[0-10]
Explicit Method

t	output	exact
0.0000000E+00	0.1000000E+01	0.1000000E+01
0.2000000E+00	0.8000000E+00	0.8187308E+00
0.4000000E+00	0.6400000E+00	0.6703200E+00
0.6000000E+00	0.5120000E+00	0.5488116E+00
0.8000000E+00	0.4096000E+00	0.4493290E+00
0.1000000E+01	0.3276800E+00	0.3678794E+00
……		
0.2000000E+01	0.1073742E+00	0.1353353E+00
……		
0.5000000E+01	0.3777893E-02	0.6737947E-02
0.8000000E+01	0.1329228E-03	0.3354626E-03
……		
0.9400000E+01	0.2787593E-04	0.8272407E-04
0.9600000E+01	0.2230075E-04	0.6772874E-04
0.9800000E+01	0.1784060E-04	0.5545160E-04
0.1000000E+02	0.1427248E-04	0.4539993E-04



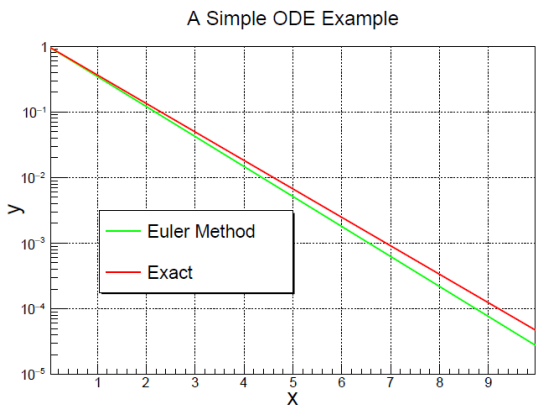


例2： CERN ROOT作图

```
void rootplot()
{
  TCanvas *c1 = new TCanvas("c1","",200,10,700,500);
  c1->SetGrid();

  Int_t n = 101;
  float Rbin[101],R2U[101],R2C[101];

  float xbin,xp,yp;
  int flag=0;
  int k0=0;
  int ka=0;
  int kb=0;
  FILE *fp = fopen("plot2.gnu","r");
  while (1) {
   flag=fscanf(fp,"%f %f %f",&xbin,&xp,&yp);
   if(flag!=3)break;
   Rbin[k0]=xbin;
   R2U[k0]=xp;
   R2C[k0]=yp;
   k0++;
  }
```

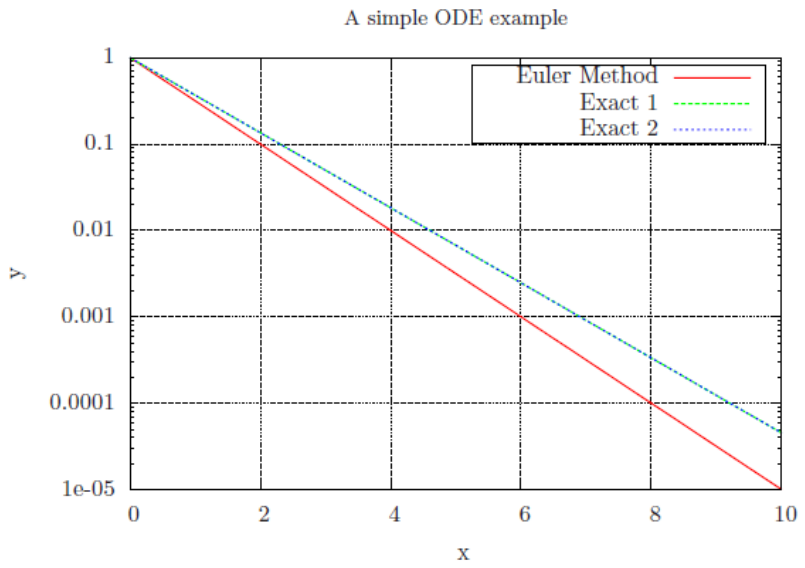



```
TMultiGraph *mg = new TMultiGraph();
 mg->SetTitle("A Simple ODE Example; x; y");
 gr = new TGraph(n,Rbin,R2U);
 gr->SetLineWidth(2);
 gr->SetLineColor(3);
 gr2 = new TGraph(n,Rbin,R2C);
 gr2->SetLineWidth(2);
 gr2->SetLineColor(2);
 mg->Add(gr);
 mg->Add(gr2);
 mg->Draw("AC");
 mg->GetXaxis()->SetRangeUser(0.1,9.9);
 mg->GetYaxis()->SetRangeUser(0.00001,1.);
 mg->GetXaxis()->SetTitle("x");
 mg->GetXaxis()->SetTitleSize(.06);
 mg->GetYaxis()->SetTitle("y");
 mg->GetYaxis()->SetTitleSize(.06);
 mg->GetXaxis()->CenterTitle();
 mg->GetYaxis()->CenterTitle();
 mg->GetXaxis()->SetTitleOffset(0.6);
 mg->GetYaxis()->SetTitleOffset(0.6);
 c1->SetLogy();
 gPad->Modified();
 TLegend *l1 = new TLegend(0.18,0.3,0.5,0.5);
 l1->SetBorderSize(2);
 l1->SetFillColor(0);
 l1->AddEntry(gr,"Euler Method","l");
 l1->AddEntry(gr2,"Exact","l");
 l1->Draw();
 c1->SaveAs("example-N100-2.pdf");
}
```

例3： GNUPLOT作图

tot.tex

```
\documentclass[17pt]{article}
\usepackage{graphicx,color}
\begin{document}
\thispagestyle{empty}
\input{data.tex}
\end{document}
```




```
set pointsize 2.0
set tics in
set log y
set mytics 10
set grid
set xrange[0:10]
set terminal epslatex color
set output "data.tex"
set title '{\small A simple ODE example}'
set ylabel 'y'
set xlabel 'x'
set xlabel offset 0.5
set ylabel offset 2.5
set key box
plot "plot.gnu"   index 0 u ($1):($2)    title 'Euler Method' w l  lt 1 lw 3 ,\
    "plot.gnu"   index 0 u ($1):($3)    title 'Exact 1' w l  lt 2 lw 3 ,\
    exp(-x)     title'Exact 2'   w l  lt 3  lw 3
set output
!latex tot.tex
!dvips -E tot.dvi -o example1.eps
!epstopdf example1.eps
```

并行计算

Modern parallel programing: **open-MP** and **MPI**.

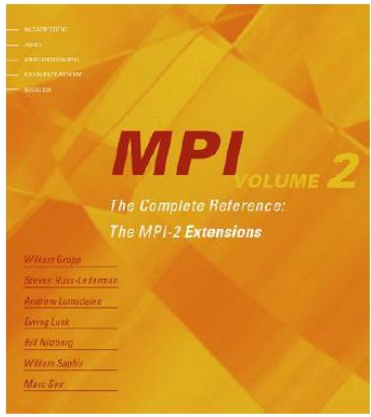
–Lots of processors connected and coordinating to solve large problems

M P I = Message Passing Interface.

https://www.mpi-forum.org/docs/

A standardized collection of routines (functions) which is implemented for each programing language (Fortran, C, C++, Python).

First standardized in 1994 (MPI-1.0) and second in 1997 (MPI-2.0) and (MPI-3.0) after 2012. Currently MPI-2.0 is most widely used.



The two most widely used implementations are

- MPICH http://www.mpich.org
- open-MPI http://www.open-mpi.org

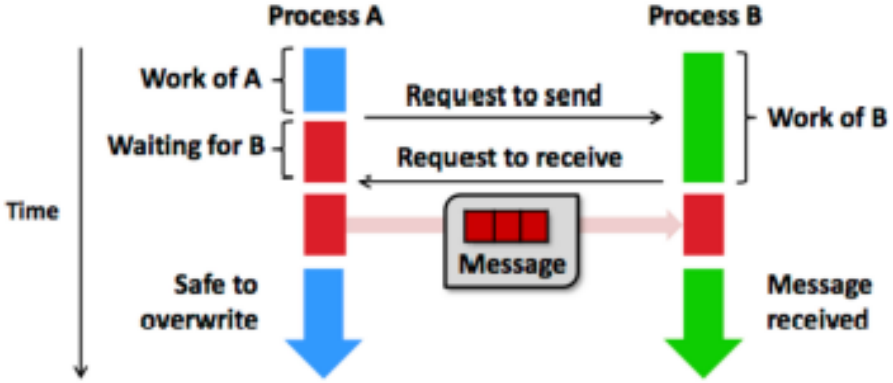
  Python implementation mpi4py

  (Note that open-MPI has nothing to do with openMP)

并行计算

sudo apt-get install libcr-dev mpich2 mpich2-doc

mpic++ -o example example.c
mpirun -n 2 ./example



MPI include file

.
.
.

Initialize MPI environment

.
.
.

Do work and make message passing calls

.
.
.

Terminate MPI Environment

并行计算

```
#include <mpi.h>
#include <stdio.h>

int main(int argc, char ** argv)
{
    int rank, size;

    MPI_Init(&argc, &argv);

    MPI_Comm_rank(MPI_COMM_WORLD, &rank);
    MPI_Comm_size(MPI_COMM_WORLD, &size);
    printf("I am %d of %d\n", rank, size);

    MPI_Finalize();
    return 0;
}
```

Basic requirements for an MPI program

Data communication in MPI is like email exchange

–One process sends a copy of the data to another process (or a group of processes), and the other process receives it

并行计算

```
printf("For rank %d count = %d itrr = %d\n",rank,count,no_div);
MPI_Reduce(&count,&total_count,1,MPI_INT,MPI_SUM,0,MPI_COMM_WORLD);
MPI_Reduce(&no_div,&fin_no,1,MPI_INT,MPI_SUM,0,MPI_COMM_WORLD);
```

```
double t1, t2;
int rank,size,i;
double x=0,y=0,pi,z;
int no = atoi(argv[1]);
int count=0,total_count=0,no_div=0,fin_no = 0;
MPI_Init(&argc,&argv);
t1 = MPI_Wtime();
MPI_Comm_rank(MPI_COMM_WORLD,&rank);
MPI_Comm_size(MPI_COMM_WORLD,&size);
printf("rank= %i ; size= %i\n", rank, size);
no_div = no/size;
srand ( time(NULL) );
for(i=0;i<no_div;i++)
        {
        x=rand()/(double)RAND_MAX;
        y=rand()/(double)RAND_MAX;
        z=x*x+y*y;
        if(z<=1)
        count++;
        }
```

```
t2 = MPI_Wtime();
printf("total time for rank %i: = %lf\n", rank, t2-t1);

if(rank ==0){
printf("        \n");
printf("*** Average over all processors ***\n");
printf("Total count  = %d, total itrr = %d\n",total_count,fin_no);
pi = ((double)total_count)/fin_no*4.0000;
printf("Pi value = %lf\n",pi);
        }
MPI_Finalize();
```

并行计算

```
qliphy@qliphy-IdeaCentre-B520:~/Desktop/CP2019-new/MPI$ mpirun -n 1 ./pi 80000000
rank= 0 ; size= 1
For rank 0 count = 62831445 itrr = 80000000
total time for rank 0: = 1.796201

*** Average over all processors ***
Total count  = 62831445, total itrr = 80000000
Pi value = 3.141572
```

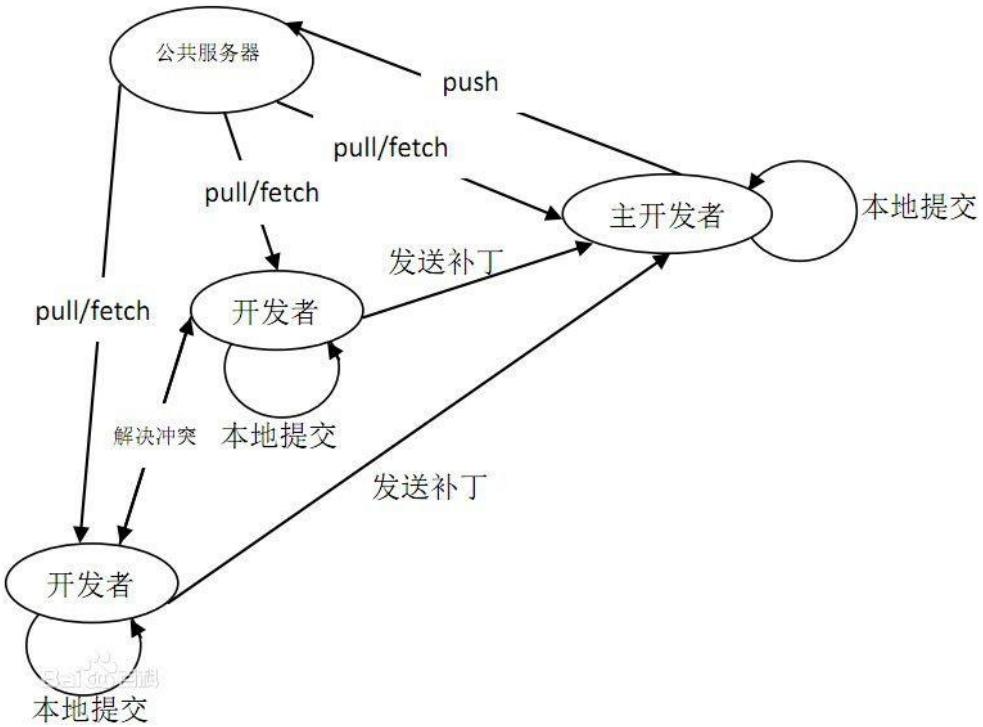
```
qliphy@qliphy-IdeaCentre-B520:~/Desktop/CP2019-new/MPI$ mpirun -n 4 ./pi 80000000
rank= 0 ; size= 4
rank= 1 ; size= 4
rank= 2 ; size= 4
rank= 3 ; size= 4
For rank 2 count = 15710006 itrr = 20000000
For rank 3 count = 15710006 itrr = 20000000
total time for rank 3: = 0.739523
total time for rank 2: = 0.739545
For rank 1 count = 15710006 itrr = 20000000
total time for rank 1: = 0.792446
For rank 0 count = 15710006 itrr = 20000000
total time for rank 0: = 0.816587

*** Average over all processors ***
Total count  = 62840024, total itrr = 80000000
Pi value = 3.142001
```

版本控制

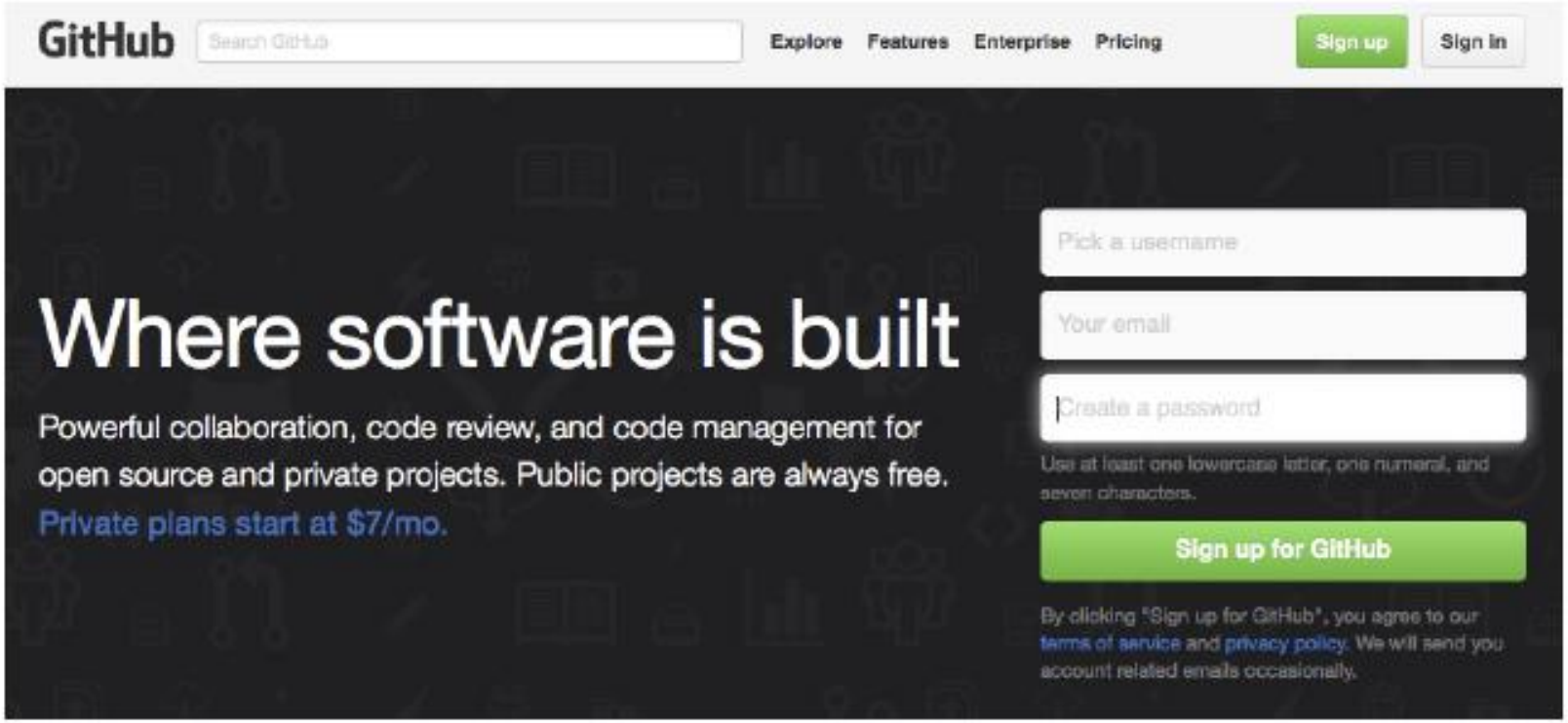
- CVS (concurrent versions system)
- SVN (subversion)
- git

GitHub is a code hosting platform for version control and collaboration. It lets you and others work together on projects from anywhere.



版本控制

Sign Up a Github Account



You will receive an activation email to confirm your email address

版本控制

Set Up Git

https://help.github.com/articles/set-up-git/

1. Download and install the latest version of Git.

In terminal:

1. $ git config --global user.name "*YOUR NAME*”
2. $ git config --global user.email "*YOUR EMAIL ADDRESS*"

Authenticating with GitHub from Git

• Connecting over HTTPS (recommended)

If you clone with HTTPS, you can
cache your GitHub password in Git using a credential helper.
https://help.github.com/articles/caching-your-github-password-ingit/

• Connecting over SSH

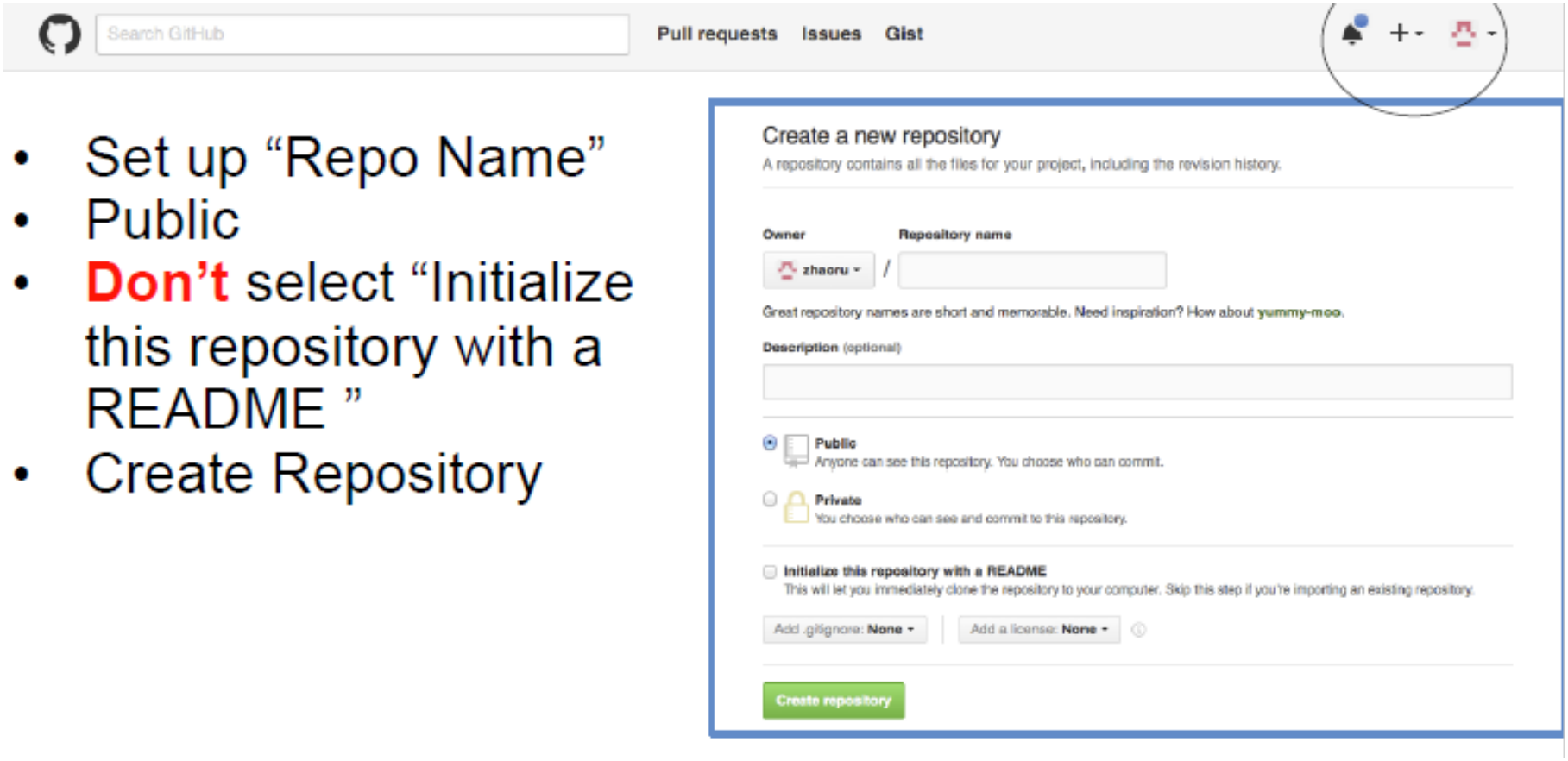
If you clone with SSH, you must generate SSH keys on each
computer you use to push or pull from GitHub.

版本控制

Create a Repo

https://help.github.com/articles/create-a-repo/

- Set up “Repo Name”
- Public
- **Don’t** select “Initialize this repository with a README ”
- Create Repository



版本控制

Upload your file to the Repo

In terminal:

$ cd “target folder”

$ echo "# TEST4" >> README.md

$ git init

$ git add README.md

$ git add *

$ git commit -m "first commit"

$ git remote add origin git@github.com:XXX/TEST4.git

(or https://)

$ git push -u origin master

Then refresh your website. Upload successfully!

版本控制

qliphy / **ComputationalPhysics2019**

Watch 0 | Star 0 | Fork 0

Code | Issues 0 | Pull requests 0 | Projects 0 | Wiki | Security | Insights | Settings

Quick setup — if you've done this kind of thing before

or HTTPS SSH `git@github.com:qliphy/ComputationalPhysics2019.git`

Get started by creating a new file or uploading an existing file. We recommend every repository include a README, LICENSE, and .gitignore.

...or create a new repository on the command line

```
echo "# ComputationalPhysics2019" >> README.md
git init
git add README.md
git commit -m "first commit"
git remote add origin git@github.com:qliphy/ComputationalPhysics2019.git
git push -u origin master
```

...or push an existing repository from the command line

```
git remote add origin git@github.com:qliphy/ComputationalPhysics2019.git
git push -u origin master
```

...or import code from another repository

You can initialize this repository with code from a Subversion, Mercurial, or TFS project.

Import code

ProTip! Use the URL for this page when adding GitHub as a remote.