

暨南大学本科实验报告专用纸

课程名称 云计算实验 成绩评定
实验项目名称 MPI 环境安装与编程 指导教师 魏林锋
实验项目编号 实验项目类型 设计 实验地点 N116
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学院 信息科学技术 系 计算机 专业 软件工程
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实验步骤

1、解压 MPI 安装包：

```
[root@master ~]# tar -xvf mpich-3.2.1.tar.gz
```

```
mpich-3.2.1/doc/notes/bnr/bnr.txt
mpich-3.2.1/doc/notes/bnr/bnr-usage.txt
mpich-3.2.1/doc/notes/agent/
mpich-3.2.1/doc/notes/agent/ca-nomenclature.fig
mpich-3.2.1/doc/notes/agent/ca-nomenclature.eps
mpich-3.2.1/doc/notes/agent/send-sm.txt
mpich-3.2.1/doc/notes/agent/outline.txt
mpich-3.2.1/doc/notes/agent/vc-sm.txt
mpich-3.2.1/doc/notes/agent/recv-sm.txt
mpich-3.2.1/doc/notes/agent/agent.txt
mpich-3.2.1/doc/notes/agent/sm2dot
mpich-3.2.1/doc/notes/pt2pt/
mpich-3.2.1/doc/notes/pt2pt/pt2pt.txt
mpich-3.2.1/doc/notes/Agenda.txt
mpich-3.2.1/doc/logging/
mpich-3.2.1/doc/logging/Makefile.in
mpich-3.2.1/doc/logging/logging.pdf
mpich-3.2.1/doc/logging/logging.tex
mpich-3.2.1/doc/installguide/
mpich-3.2.1/doc/installguide/Makefile.in
mpich-3.2.1/doc/installguide/cfile
mpich-3.2.1/doc/installguide/install.pdf
mpich-3.2.1/doc/installguide/getusage
mpich-3.2.1/doc/installguide/install.tex.vin
[root@master gan]#
```

2、切换目录：

```
[root@master ~]# cd mpich-3.2.1
```

3、指定 mpich-3.2.1 的安装目录，并编译环境：

```
[root@master mpich-3.2.1]# ./configure --prefix=/usr/mpich-3.2.1 --disable-fortran --disable-cxx
[root@master mpich-3.2.1]# make && make install
```

```
config.status: creating threads/testlist
config.status: creating errors/testlist
config.status: creating errors/cxx/testlist
config.status: creating errors/f77/testlist
config.status: creating errors/f90/testlist
config.status: creating impls/testlist
config.status: creating f77/rma/testlist
config.status: creating f90/rma/testlist
config.status: creating f08/rma/testlist
config.status: creating impls/Makefile
config.status: creating impls/hydra/Makefile
config.status: creating impls/hydra/proc_binding.sh
config.status: creating impls/mpich/Makefile
config.status: creating impls/mpich/testlist
config.status: creating impls/mpich/mpi_t/Makefile
config.status: creating include/mpitestconf.h
config.status: include/mpitestconf.h is unchanged
config.status: executing depfiles commands
config.status: executing default-1 commands
config.status: executing default-2 commands
config.status: executing default-3 commands
config.status: executing default-4 commands
Configuration completed.
[root@master mpich-3.2.1] #
```

```

CC      tools/bootstrap/external/rsh_env.lo
CC      tools/bootstrap/external/ssh_init.lo
CC      tools/bootstrap/external/ssh.lo
CC      tools/bootstrap/external/ssh_env.lo
CC      tools/bootstrap/external/ssh_finalize.lo
CC      tools/bootstrap/external/slurm_init.lo
CC      tools/bootstrap/external/slurm_launch.lo
CC      tools/bootstrap/external/slurm_env.lo
CC      tools/bootstrap/external/slurm_query_native_int.lo
CC      tools/bootstrap/external/slurm_query_node_list.lo
CC      tools/bootstrap/external/slurm_query_proxy_id.lo
CC      tools/bootstrap/external/ll_init.lo
CC      tools/bootstrap/external/ll_launch.lo
CC      tools/bootstrap/external/ll_query_native_int.lo
CC      tools/bootstrap/external/ll_query_node_list.lo
CC      tools/bootstrap/external/ll_query_proxy_id.lo
CC      tools/bootstrap/external/ll_env.lo
CC      tools/bootstrap/external/lsf_init.lo
CC      tools/bootstrap/external/lsf_query_native_int.lo
CC      tools/bootstrap/external/lsf_query_node_list.lo
CC      tools/bootstrap/external/lsf_env.lo
CC      tools/bootstrap/external/sge_init.lo
CC      tools/bootstrap/external/sge_query_native_int.lo
CC      tools/bootstrap/external/sge_query_node_list.lo
CC      tools/bootstrap/external/sge_env.lo
CC      tools/bootstrap/external/pbs_init.lo
CC      tools/bootstrap/external/pbs_query_native_int.lo
CC      tools/bootstrap/external/pbs_query_node_list.lo
CC      tools/bootstrap/external/cobalt_init.lo
CC      tools/bootstrap/external/cobalt_query_native_int.lo
CC      tools/bootstrap/external/cobalt_query_node_list.lo
CC      tools/bootstrap/persist/persist_init.lo
CC      tools/bootstrap/persist/persist_launch.lo
CC      tools/bootstrap/persist/persist_wait.lo
CC      tools/ckpoint/ckpoint.lo
CC      tools/demux/demux.lo
CC      tools/demux/demux_poll.lo
CC      tools/demux/demux_select.lo
CC      tools/debugger/debugger.lo
CC      ui/utls/uiu.lo
CCLD    libhydra.la
CC      pm/pmiserp/pmiserp_pmi.lo
CC      pm/pmiserp/pmiserp_pmi_v1.lo

```

4、修改环境变量：

```

[root@master mpich-3.2.1]# vim /etc/profile
export PATH=/usr/mpich-3.2.1/bin:$PATH
[root@master mpich-3.2.1]# source /etc/profile

```

```

export PATH=/usr/mpich-3.2.1/bin:$PATH
[root@master mpich-3.2.1] #

```

5、切换到 examples 目录，编译并运行 hellow 程序：

```

[root@master examples]# cd examples
[root@master examples]# mpicc hellow.c -o hellow
[root@master examples]# mpirun -np 4 ./hellow

```

```
[mpiexec@master] main (ui/mpich/mpiexec.c:149): error parsing parameters
[root@master examples] # mpirun -np 4 ./hellow
Hello world from process 0 of 4
Hello world from process 1 of 4
Hello world from process 2 of 4
Hello world from process 3 of 4
[root@master examples] #
```

6、新建 trapezoid.c 文件，编译并运行 trapezoid 程序：

```
[root@master examples]# vim trapezoid.c

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

double f(double x)
{
    double y;
    y=4/(1+x*x);
    return y;
}

double Trap(double left_endpt,double right_endpt,int trap_count,double base_len)
{
    double estimate,x;
    estimate=(f(left_endpt)+f(right_endpt))/2.0;
    int i;
    for(i=1;i<trap_count;i++)
    {
        x=left_endpt+i*base_len;
        estimate+=f(x);
    }
    estimate=estimate*base_len;
    return estimate;
}

int main(int argc,char **argv)
{
    int numProcs,rank;
    double a,b,n;
    int i;
    MPI_Status status;
    MPI_Init(&argc,&argv);
    MPI_Comm_size(MPI_COMM_WORLD,&numProcs);
    MPI_Comm_rank(MPI_COMM_WORLD,&rank);
    if(rank==0)
    {
        printf("Please input a,b,n\n");
```

```

scanf("%lf%lf%lf",&a,&b,&n);

for(i=1;i<numProcs;i++)
{
    MPI_Send(&a,1,MPI_DOUBLE,i,0,MPI_COMM_WORLD);
    MPI_Send(&b,1,MPI_DOUBLE,i,0,MPI_COMM_WORLD);
    MPI_Send(&n,1,MPI_DOUBLE,i,0,MPI_COMM_WORLD);
}
}
else
{
    MPI_Recv(&a,1,MPI_DOUBLE,0,0,MPI_COMM_WORLD,MPI_STATUS_IGNORE);
    MPI_Recv(&b,1,MPI_DOUBLE,0,0,MPI_COMM_WORLD,MPI_STATUS_IGNORE);
    MPI_Recv(&n,1,MPI_DOUBLE,0,0,MPI_COMM_WORLD,MPI_STATUS_IGNORE);
}
double h,local_n;
h=(b-a)/n;
local_n=n/numProcs;
double get_trap[numProcs];
double local_a=a+rank*local_n*h;
double local_b=local_a+local_n*h;
double local_trap=Trap(local_a,local_b,local_n,h);
printf("local trap is :%lf\n",local_trap);
double total_trap;

MPI_Reduce(&local_trap,&total_trap,1,MPI_DOUBLE,MPI_SUM,0,MPI_COMM_WORLD);

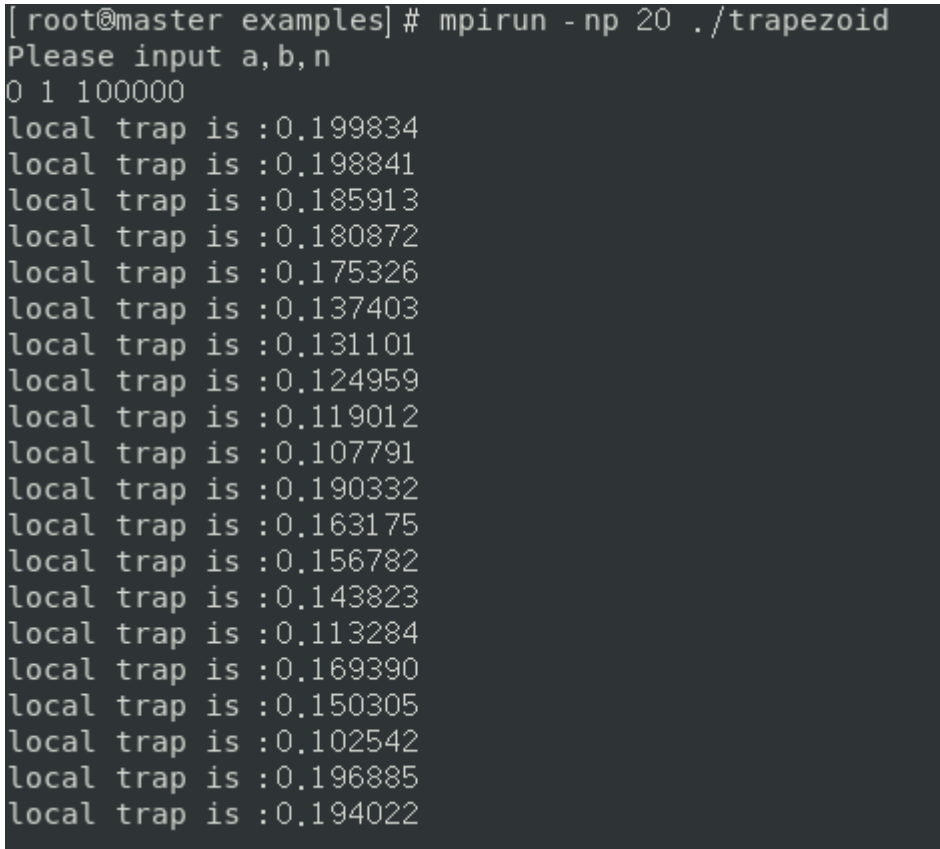
MPI_Gather(&local_trap,1,MPI_DOUBLE,get_trap,1,MPI_DOUBLE,0,MPI_COMM_WORLD);
MPI_Send(&local_trap,1,MPI_DOUBLE,0,99,MPI_COMM_WORLD);
if(rank==0)
{
    printf("Use Reduce: Integral from %.0f to %.0f = %lf\n",a,b,total_trap);
    total_trap=0;
    for(i=0;i<numProcs;i++)
        total_trap+=get_trap[i];
    printf("Use Gather: Integral from %.0f to %.0f = %lf\n",a,b,total_trap);
    total_trap=0;
    for(i=0;i<numProcs;i++)
    {
        MPI_Probe(MPI_ANY_SOURCE,99,MPI_COMM_WORLD,&status);

MPI_Recv(get_trap+status.MPI_SOURCE,1,MPI_DOUBLE,status.MPI_SOURCE,99,MPI_COMM_WORLD,&status);
    }
}

```

```
        for(i=0;i<numProcs;i++)
            total_trap+=get_trap[i];
        printf("Use Send: Integral from %.0f to %.0f = %lf\n",a,b,total_trap);
    }
    MPI_Finalize();
    return 0;
}
```

```
[root@master examples]# mpicc trapezoid.c -o trapezoid
[root@master examples]# mpirun -np 20 ./trapezoid
```



```
[root@master examples] # mpirun -np 20 ./trapezoid
Please input a,b,n
0 1 100000
local trap is :0.199834
local trap is :0.198841
local trap is :0.185913
local trap is :0.180872
local trap is :0.175326
local trap is :0.137403
local trap is :0.131101
local trap is :0.124959
local trap is :0.119012
local trap is :0.107791
local trap is :0.190332
local trap is :0.163175
local trap is :0.156782
local trap is :0.143823
local trap is :0.113284
local trap is :0.169390
local trap is :0.150305
local trap is :0.102542
local trap is :0.196885
local trap is :0.194022
```

实验体会

本次实验为 MP 环境安装与编程，实验较为简单。但是在实验过程中要注意文件的存储位置，否则会出错。