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Windows PowerShell
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安装最新的 PowerShell，了解新功能和改进！https://aka.ms/PSWindows

PS D:\whk\work> docker ps
CONTAINER ID   IMAGE                COMMAND                  CREATED        STATUS        PORTS        NAMES
e648f7392d84   scucpphw_test_img:latest  "/bin/bash"            10 minutes ago Up 6 minutes   22/tcp       boring_ptolemy
PS D:\whk\work> docker run hello-world

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
1. The Docker client contacted the Docker daemon.
2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
   (amd64)
3. The Docker daemon created a new container from that image which runs the
   executable that produces the output you are currently reading.
4. The Docker daemon streamed that output to the Docker client, which sent it
   to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
$ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
https://hub.docker.com/

For more examples and ideas, visit:
https://docs.docker.com/get-started/
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Windows PowerShell

3. The Docker daemon created a new container from that image which runs the
executable that produces the output you are currently reading.
4. The Docker daemon streamed that output to the Docker client, which sent it
to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
$ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
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PS D:\whk\work> docker images
REPOSITORY    TAG       IMAGE ID       CREATED        SIZE
scucpphw_test_img  latest   a698770a4c1f   29 hours ago   1.3GB
hello-world     latest   feb5d9fea6a5   17 months ago  13.3kB
PS D:\whk\work> docker ps
CONTAINER ID   IMAGE                COMMAND                  CREATED        STATUS        PORTS        NAMES
e648f7392d84   scucpphw_test_img:latest  "/bin/bash"            11 minutes ago Up 7 minutes   22/tcp       boring_ptolemy
PS D:\whk\work> docker exec -it e648f7392d84 /bin/bash
root@e648f7392d84:/# ls
bin boot code dev etc home lib lib64 media mnt opt proc root run sbin srv sys tmp usr var ws
root@e648f7392d84:/# cd ws
root@e648f7392d84:/ws# mkdir code
root@e648f7392d84:/ws# ls
Dockerfile code
root@e648f7392d84:/ws# cd code
root@e648f7392d84:/ws/code# |
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Windows PowerShell
root@e648f7392d84:/ws/code/question3# ls
a.out inefficiency.cpp other_test test test.cpp test.i test.o test.s with_o.out without_o.out
root@e648f7392d84:/ws/code/question3# a.out
bash: a.out: command not found
root@e648f7392d84:/ws/code/question3# test.i
bash: test.i: command not found
root@e648f7392d84:/ws/code/question3# test.o
bash: test.o: command not found
root@e648f7392d84:/ws/code/question3# test.s
bash: test.s: command not found
root@e648f7392d84:/ws/code/question3# test
root@e648f7392d84:/ws/code/question3# time ./with_o.out
result = 100904034

real    0m0.008s
user    0m0.001s
sys     0m0.000s
root@e648f7392d84:/ws/code/question3# time ./without_o.out
result = 100904034

real    0m1.779s
user    0m1.762s
sys     0m0.010s
root@e648f7392d84:/ws/code/question3# cd other_test/
root@e648f7392d84:/ws/code/question3/other_test# ls
a.out      test_class_size.cpp  test_move.cpp  test_ptr.cpp
test_class.cpp test_default_parameter.cpp test_noexcept.cpp test_raii.cpp
root@e648f7392d84:/ws/code/question3/other_test# g++ test_class.cpp
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Windows PowerShell
root@e648f7392d84:/ws/code/question3/other_test# ls
a.out      test_class_size.cpp  test_move.cpp  test_ptr.cpp
test_class.cpp test_default_parameter.cpp test_noexcept.cpp test_raii.cpp
root@e648f7392d84:/ws/code/question3/other_test# g++ test_class.cpp
root@e648f7392d84:/ws/code/question3/other_test# g++ -E test_class_size.cpp -o test
root@e648f7392d84:/ws/code/question3/other_test# ls
a.out test_class.cpp test_default_parameter.cpp test_noexcept.cpp test_raii.cpp
test test_class_size.cpp test_move.cpp test_ptr.cpp
root@e648f7392d84:/ws/code/question3/other_test# rm test
root@e648f7392d84:/ws/code/question3/other_test# g++ -E test_class_size.cpp -o
g++: error: missing filename after '-o'
root@e648f7392d84:/ws/code/question3/other_test# g++ -E test_class_size.cpp -o test.i
root@e648f7392d84:/ws/code/question3/other_test# g++ test_class.cpp -O2 -o test1
root@e648f7392d84:/ws/code/question3/other_test# ls
a.out test1 test_class_size.cpp test_move.cpp test_ptr.cpp
test.i test_class.cpp test_default_parameter.cpp test_noexcept.cpp test_raii.cpp
root@e648f7392d84:/ws/code/question3/other_test# time test1
bash: test1: command not found

real    0m0.002s
user    0m0.001s
sys     0m0.001s
root@e648f7392d84:/ws/code/question3/other_test# time ./test1
1      #21325302 is created
1      #58320212 is created
5      #21325302      5000      5000
25     #58320212      10000     10000
45     #21325302      5500      10500
45     #21325302      5500      10500
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Windows PowerShell
1      #58320212 is created
5      #21325302      5000      5000
25     #58320212      10000     10000
45     #21325302      5500      10500
60     #58320212      -4000     6000
90     #21325302      27.64     10527.6
90     #58320212      21.78     6021.78
#21325302      Balance: 10527.6
#58320212      Balance: 6021.78

real    0m0.009s
user    0m0.002s
sys     0m0.000s
root@e648f7392d84:/ws/code/question3/other_test# g++ test_class.cpp -O1 -o test1
root@e648f7392d84:/ws/code/question3/other_test# time ./test1
1      #21325302 is created
1      #58320212 is created
5      #21325302      5000      5000
25     #58320212      10000     10000
45     #21325302      5500      10500
60     #58320212      -4000     6000
90     #21325302      27.64     10527.6
90     #58320212      21.78     6021.78
#21325302      Balance: 10527.6
#58320212      Balance: 6021.78

real    0m0.007s
user    0m0.002s
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Windows PowerShell
user      0m0.002s
sys       0m0.000s
root@e648f7392d84:/ws/code/question3/other_test# g++ test_class.cpp -O0 -o test0
root@e648f7392d84:/ws/code/question3/other_test# time ./test0
1      #21325302 is created
1      #58320212 is created
5      #21325302      5000      5000
25     #58320212      10000     10000
45     #21325302      5500      10500
60     #58320212      -4000     6000
90     #21325302      27.64     10527.6
90     #58320212      21.78     6021.78
#21325302      Balance: 10527.6
#58320212      Balance: 6021.78

real      0m0.008s
user      0m0.001s
sys       0m0.000s
root@e648f7392d84:/ws/code/question3/other_test# g++ test_class_size.cpp -O0 -o size0
root@e648f7392d84:/ws/code/question3/other_test# time ./size0
Size of Student: 8
Number: 12345678
Level:  sophomore
Grade:  B

real      0m0.008s
user      0m0.002s
sys       0m0.000s
```

```
Windows PowerShell
Number: 12345678
Level:  sophomore
Grade:  B

real      0m0.008s
user      0m0.002s
sys       0m0.000s
root@e648f7392d84:/ws/code/question3/other_test# g++ test_class_size.cpp -O2 -o size2
root@e648f7392d84:/ws/code/question3/other_test# time ./size2
Size of Student: 8
Number: 12345678
Level:  sophomore
Grade:  B

real      0m0.008s
user      0m0.000s
sys       0m0.002s
root@e648f7392d84:/ws/code/question3/other_test# g++ -Wall test_class_size.cpp -o size
root@e648f7392d84:/ws/code/question3/other_test# time ./size
Size of Student: 8
Number: 12345678
Level:  sophomore
Grade:  B

real      0m0.009s
user      0m0.002s
sys       0m0.000s
root@e648f7392d84:/ws/code/question3/other_test# g++ -Wall -std=c++17 test_class_size.cpp -o size
```

```
Windows PowerShell
Number: 12345678
Level: sophomore
Grade: B

real 0m0.008s
user 0m0.000s
sys 0m0.002s
root@e648f7392d84:/ws/code/question3/other_test# g++ -Wall test_class_size.cpp -o size
root@e648f7392d84:/ws/code/question3/other_test# time ./size
Size of Student: 8
Number: 12345678
Level: sophomore
Grade: B

real 0m0.009s
user 0m0.002s
sys 0m0.000s
root@e648f7392d84:/ws/code/question3/other_test# g++ -Wall -std=c++17 test_class_size.cpp -o size
root@e648f7392d84:/ws/code/question3/other_test# time ./size
Size of Student: 8
Number: 12345678
Level: sophomore
Grade: B

real 0m0.009s
user 0m0.001s
sys 0m0.000s
root@e648f7392d84:/ws/code/question3/other_test# |
```

```
Windows PowerShell
Breakpoint 4 at 0x40121e: file test_function_overload.cpp, line 15.
(gdb) bt
#0 main () at test_function_overload.cpp:15
(gdb) n
Enter two integer: 2 3
16 cout << "Their sum of square: " << sumOfSquare(m, n) << endl;
(gdb) n

Breakpoint 1, sumOfSquare (a=2, b=3) at test_function_overload.cpp:5
5 return a * a + b * b;
(gdb) bt
#0 sumOfSquare (a=2, b=3) at test_function_overload.cpp:5
#1 0x0000000000401262 in main () at test_function_overload.cpp:16
(gdb) n
6 }
(gdb) n
Their sum of square: 13
main () at test_function_overload.cpp:19
19 cout << "Enter two real number: ";
(gdb) n
20 cin >> x >> y;
(gdb) n
Enter two real number: 2.2 1.1
21 cout << "Their sum of square: " << sumOfSquare(x, y) << endl;
(gdb) n

Breakpoint 2, sumOfSquare (a=2.2000000000000002, b=1.1000000000000001) at test_function_overload.cpp:9
9 return a * a + b * b;
(gdb) bt
#0 sumOfSquare (a=2.2000000000000002, b=1.1000000000000001) at test_function_overload.cpp:9
#1 0x00000000004012d4 in main () at test_function_overload.cpp:21
```

```
Windows PowerShell
test_range_based.cpp
8 {
9     int x[10] = { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 };
10
11     for( int y : x ) { // Access by value using a copy declared as a specific type.
12         // Not preferred.
13         cout << y << " ";
14     }
15     cout << endl;
16
17     for( auto y : x ) { // Copy of 'x', almost always undesirable
18         cout << y << " ";
19     }
20     cout << endl;
21
22     for( auto &y : x ) { // Type inference by reference.
23         cout << y << " ";
24     }
25     cout << endl;
}

native process 2578 In: main
1: y = 4214944
(gdb) n
1: y = 1
(gdb) n
1: y = 1
(gdb) n
1: y = 2
(gdb) n
1: y = 2
(gdb) |
```

```
Windows PowerShell
test_range_based.cpp
8      {
9          int x[10] = { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 };
10
11          for( int y : x ) { // Access by value using a copy declared as a specific type.
12                          // Not preferred.
13              cout << y << " ";
14          }
15          cout << endl;
16
17          for( auto y : x ) { // Copy of 'x', almost always undesirable
18              cout << y << " ";
19          }
20          cout << endl;
21
22          for( auto &y : x ) { // Type inference by reference.
23              cout << y << " ";
24          }
25          cout << endl;
26      }
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```
Windows PowerShell
25      cout << endl;
31      cout << "end of integer array test" << endl;
32      cout << endl;
33
34      vector<double> v;
35      for (int i = 0; i < 10; ++i) {
36          v.push_back(i + 0.14159);
37      }
38
39      for(const auto &j : v) {
>40          cout << j << " ";
41      }
42      cout << endl;
43      cout << "end of vector test" << endl;
44  }
45
4: y = (const int &) @0x7fff733070f8: 7
4: y = (const int &) @0x7fff733070f8: 7
(gdb) d display 5
(gdb) n
6: j = (const double &) @0x11cf388: 1.1415899999999999
(gdb) n
6: j = (const double &) @0x11cf390: 2.1415899999999999
(gdb) n
6: j = (const double &) @0x11cf390: 2.1415899999999999
(gdb) n
6: j = (const double &) @0x11cf398: 3.1415899999999999
(gdb) |
```

```
Windows PowerShell
21      }
19      inline int Max(const T& a, const T& b){
20          return (a>b ? a:b);
21      }
22      const int C::NUM;
23      int main() {
B+ 24          cout << p << endl;
25          C c;
26          cout << &c.NUM << endl;
27
28          cout << C::NUM1 << endl;
29
>30          int a=5, b=0;
31          cout<<MAX(++a, b)<<endl;
32          cout<<MAX(++a, b+10)<<endl;
33          a=5,b=0;
34          cout<<Max(++a,b)<<endl;
35      }
For more information about this security protection see the
--Type <RET> for more, q to quit, c to continue without paging--
info "(gdb)Auto-loading safe path"

Breakpoint 1, main () at test_const.cpp:24
(gdb) n
hello
(gdb) n
0x402004
(gdb) n
3
(gdb) |
```

```
Windows PowerShell
21     }
19     inline int Max(const T& a, const T& b){
20         return (a>b ? a:b);
21     }
22     const int C::NUM;
23     int main() {
B+ 24         cout << p << endl;
25         C c;
26         cout << &c.NUM << endl;
27
28         cout << C::NUM1 << endl;
29
>30         int a=5, b=0;
31         cout<<MAX(++a, b)<<endl;
32         cout<<MAX(++a, b+10)<<endl;
33         a=5,b=0;
34         cout<<Max(++a,b)<<endl;
35     }
For more information about this security protection see the
--Type <RET> for more, q to quit, c to continue without paging--
No symbol "p" in current context.
(gdb) display &c.NUM
1: &c.NUM = <error: Attempt to take address of value not located in memory.>
(gdb) display C::NUM1
2: C::NUM1 = C::NUM1
(gdb) display c.NUM
3: c.NUM = 3
(gdb) dispaly &C::NUM1
Undefined command: "dispaly". Try "help".
(gdb) |
```

```
Windows PowerShell
21     }
9     public:
10
11         static const int NUM = 3;
12         enum con {
13             NUM1 = 3
14         };
15     };
16
17     #define MAX(a,b) ((a) > (b) ? (a) : (b))
18     template<typename T>
19     inline int Max(const T& a, const T& b){
20         return (a>b ? a:b);
21     }
22     const int C::NUM;
23     int main() {
B+ 24         cout << p << endl;
25         C c;
26
27         cout << C::NUM1 << endl;
28     }
For more information about this security protection see the
--Type <RET> for more, q to quit, c to continue without paging--
(gdb) dispaly &C::NUM1
Undefined command: "dispaly". Try "help".
(gdb) display &C::NUM1
4: &C::NUM1 = <error: Can't take address of "C::NUM1" which isn't an lvalue.>
(gdb) n
1: &c.NUM = <error: Attempt to take address of value not located in memory.>
2: C::NUM1 = C::NUM1
3: c.NUM = 3
4: &C::NUM1 = <error: Can't take address of "C::NUM1" which isn't an lvalue.>
(gdb) |
```