

無人載具技術與應用

2024 上機考


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考前複習





rosservice - Guess Number


https://github.com/Waywrong/ros_course/blob/main/finalExam/src/myExam01_srv.cpp



 **Waywrong** / **ros_course** Public

 Notifications  Fork 1  Star 2 

 **Code**  Issues  Pull requests  Actions  Projects  Security  Insights





  main  **ros_course** / **finalExam** / **src** / **myExam01_srv.cpp** 



 **Waywrong** FinalExam2024 5873a84 · 1 minute ago 

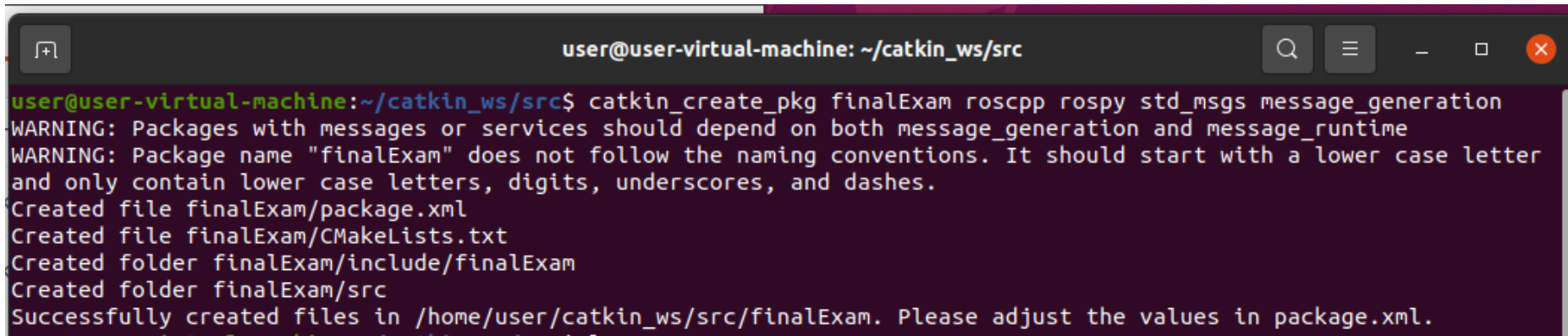
55 lines (45 loc) · 1.28 KB

Code **Blame**

```
1  #include "ros/ros.h"
2  #include <string>
3  #include <cstdlib>
4  #include <iostream>
5  #include "finalExam/SrvGuessNum.h"
6
7  using namespace std;
8
9  int g_iSecret;
10 int g_guessCNT = 0;
11 int lb = 10, ub = 20; //Upper_Bound to Lower_Bound
```

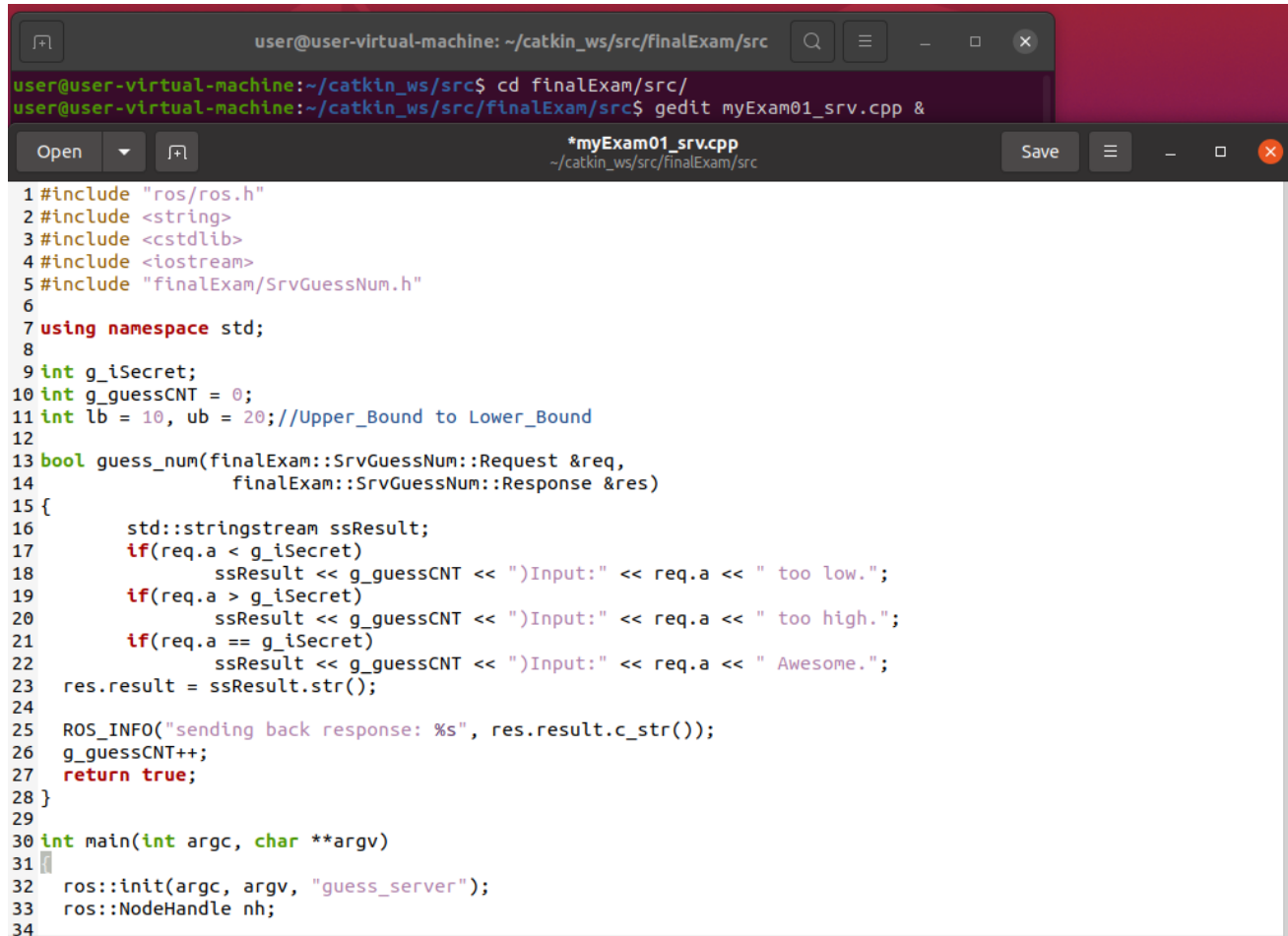
ros node 01



```
user@user-virtual-machine: ~/catkin_ws/src
user@user-virtual-machine:~/catkin_ws/src$ catkin_create_pkg finalExam roscpp rospy std_msgs message_generation
WARNING: Packages with messages or services should depend on both message_generation and message_runtime
WARNING: Package name "finalExam" does not follow the naming conventions. It should start with a lower case letter
and only contain lower case letters, digits, underscores, and dashes.
Created file finalExam/package.xml
Created file finalExam/CMakeLists.txt
Created folder finalExam/include/finalExam
Created folder finalExam/src
Successfully created files in /home/user/catkin_ws/src/finalExam. Please adjust the values in package.xml.
```

```
cd catkin_ws/src/
catkin_create_pkg finalExam roscpp rospy std_msgs message_generationls
```

ros node 02



The image shows a terminal window and a code editor window. The terminal window displays the commands to navigate to the source directory and open the file `myExam01_srv.cpp` in `gedit`. The code editor window shows the contents of `myExam01_srv.cpp`, which is a C++ file for a ROS service node. The code includes necessary headers, defines a global secret and guess count, and implements a `guess_num` service function that checks if a guess is correct, too low, or too high. The `main` function initializes the ROS node and starts the service.

```
user@user-virtual-machine: ~/catkin_ws/src/finalExam/src
user@user-virtual-machine:~/catkin_ws/src$ cd finalExam/src/
user@user-virtual-machine:~/catkin_ws/src/finalExam/src$ gedit myExam01_srv.cpp &

*myExam01_srv.cpp
~/catkin_ws/src/finalExam/src

1 #include "ros/ros.h"
2 #include <string>
3 #include <cstdlib>
4 #include <iostream>
5 #include "finalExam/SrvGuessNum.h"
6
7 using namespace std;
8
9 int g_iSecret;
10 int g_guessCNT = 0;
11 int lb = 10, ub = 20; //Upper_Bound to Lower_Bound
12
13 bool guess_num(finalExam::SrvGuessNum::Request &req,
14                finalExam::SrvGuessNum::Response &res)
15 {
16     std::stringstream ssResult;
17     if(req.a < g_iSecret)
18         ssResult << g_guessCNT << ")Input:" << req.a << " too low.";
19     if(req.a > g_iSecret)
20         ssResult << g_guessCNT << ")Input:" << req.a << " too high.";
21     if(req.a == g_iSecret)
22         ssResult << g_guessCNT << ")Input:" << req.a << " Awesome.";
23     res.result = ssResult.str();
24
25     ROS_INFO("sending back response: %s", res.result.c_str());
26     g_guessCNT++;
27     return true;
28 }
29
30 int main(int argc, char **argv)
31 {
32     ros::init(argc, argv, "guess_server");
33     ros::NodeHandle nh;
34 }
```

```
cd my_finalExam/src/
gedit myExam01_srv.cpp &
```

```
#include "ros/ros.h"
#include <string>
#include <cstdlib>
#include <iostream>
#include "finalExam/SrvGuessNum.h"
using namespace std;
int g_iSecret;
int g_guessCNT = 0;
int lb = 10, ub = 20;//Upper_Bound to Lower_Bound
bool guess_num(finalExam::SrvGuessNum::Request &req,
               finalExam::SrvGuessNum::Response &res)
{
    std::stringstream ssResult;
    if(req.a < g_iSecret)
        ssResult << g_guessCNT << ")Input:" << req.a << " too low.";
    if(req.a > g_iSecret)
        ssResult << g_guessCNT << ")Input:" << req.a << " too high.";
    if(req.a == g_iSecret)
        ssResult << g_guessCNT << ")Input:" << req.a << " Awesome.";
    res.result = ssResult.str();
    ROS_INFO("sending back response: %s", res.result.c_str());
    g_guessCNT++;
    return true;
}
```

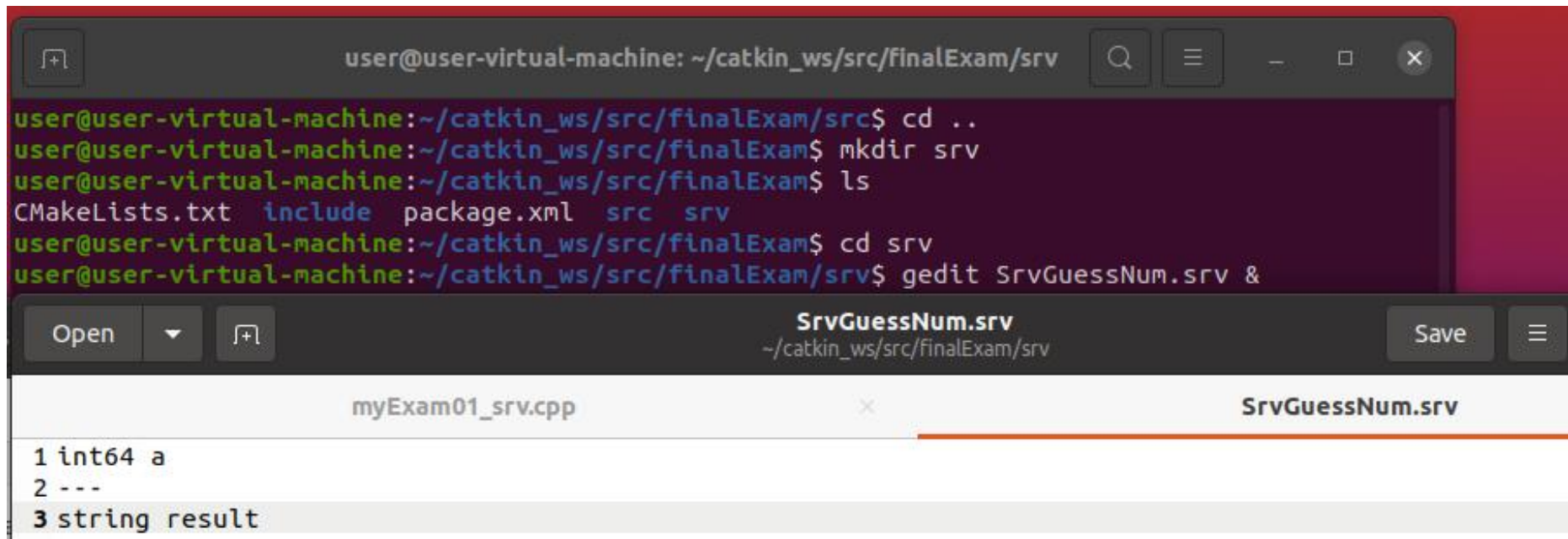
```

int main(int argc, char **argv)
{
    ros::init(argc, argv, "guess_server");
    ros::NodeHandle nh;
    if (argc != 3 )
    {
        std::cout<<"Usage: " << argv[0] << " [Lower_Bound] [Upper_Bound]" << std::endl;
        return -1;
    }
    else
    {
        lb = strtol(argv[1], NULL, 10);
        ub = strtol(argv[2], NULL, 10);
    }
    //random num
    g_iSecret = (rand() % (ub - lb + 1)) + lb;
    ros::ServiceServer guess_service_server = nh.advertiseService("guess_num_srv", guess_num);
    ROS_INFO("ready srv server!");
    ros::spin();
    return 0;
}

```

ros node 04

```
cd ..  
mkdir srv  
cd srv  
gedit SrvGuessNum.srv &
```



The screenshot shows a terminal window and a text editor window. The terminal window displays the following commands and their outputs:

```
user@user-virtual-machine: ~/catkin_ws/src/finalExam/srv  
user@user-virtual-machine:~/catkin_ws/src/finalExam/src$ cd ..  
user@user-virtual-machine:~/catkin_ws/src/finalExam$ mkdir srv  
user@user-virtual-machine:~/catkin_ws/src/finalExam$ ls  
CMakeLists.txt  include  package.xml  src  srv  
user@user-virtual-machine:~/catkin_ws/src/finalExam$ cd srv  
user@user-virtual-machine:~/catkin_ws/src/finalExam/srv$ gedit SrvGuessNum.srv &
```

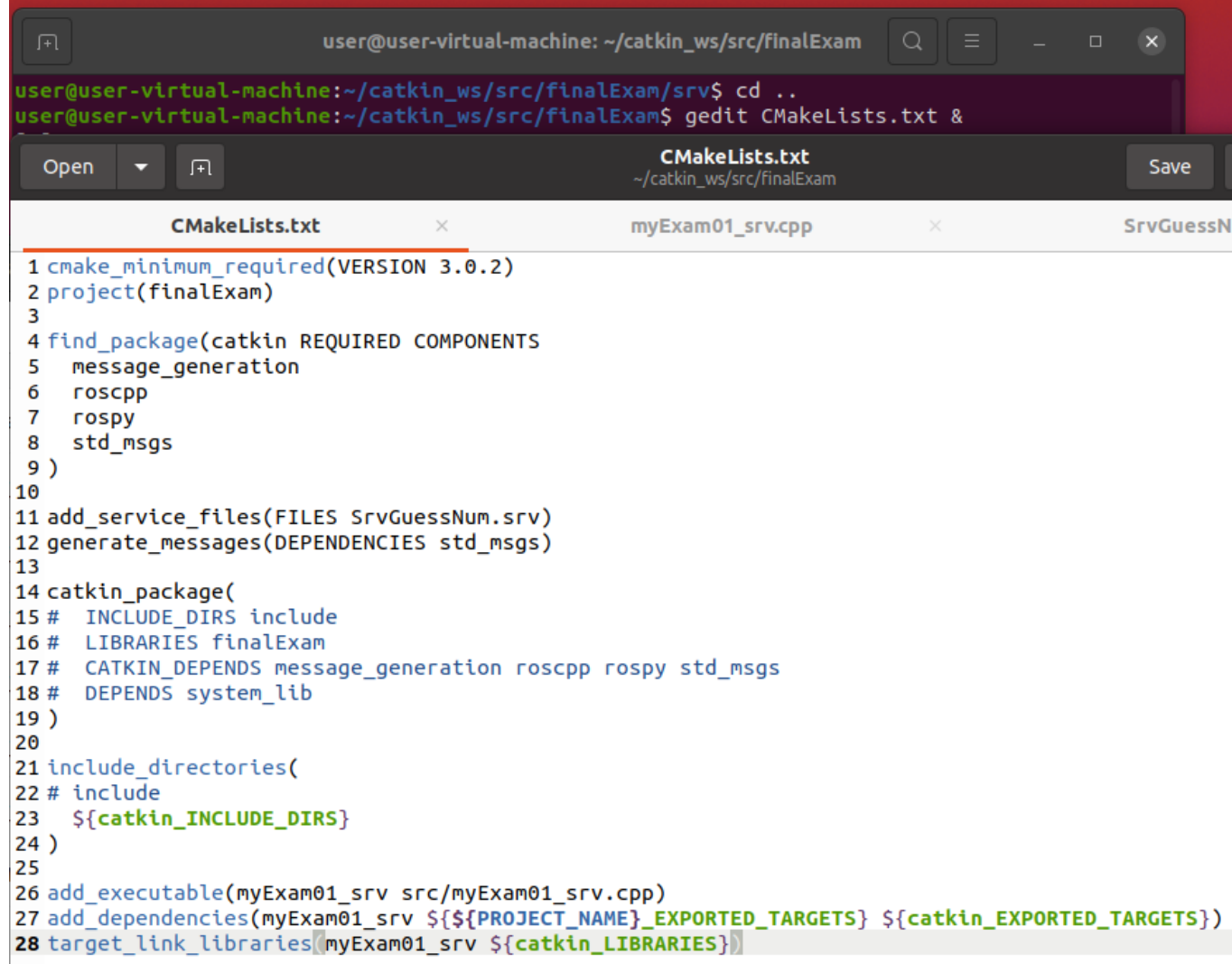
The text editor window shows the content of the `SrvGuessNum.srv` file:

```
1 int64 a  
2 ---  
3 string result
```

```
int64 a  
---  
string result
```


cd ..

gedit CMakeLists.txt &



The image shows a terminal window at the top and a code editor window below it. The terminal window has a title bar 'user@user-virtual-machine: ~/catkin_ws/src/finalExam' and shows the following commands and output:

```
user@user-virtual-machine:~/catkin_ws/src/finalExam/srv$ cd ..
user@user-virtual-machine:~/catkin_ws/src/finalExam$ gedit CMakeLists.txt &
```

The code editor window has a title bar 'CMakeLists.txt' and a 'Save' button. It shows the following CMakeLists.txt content:

```
1 cmake_minimum_required(VERSION 3.0.2)
2 project(finalExam)
3
4 find_package(catkin REQUIRED COMPONENTS
5   message_generation
6   roscpp
7   rospy
8   std_msgs
9 )
10
11 add_service_files(FILES SrvGuessNum.srv)
12 generate_messages(DEPENDENCIES std_msgs)
13
14 catkin_package(
15 #   INCLUDE_DIRS include
16 #   LIBRARIES finalExam
17 #   CATKIN_DEPENDS message_generation roscpp rospy std_msgs
18 #   DEPENDS system_lib
19 )
20
21 include_directories(
22 # include
23   ${catkin_INCLUDE_DIRS}
24 )
25
26 add_executable(myExam01_srv src/myExam01_srv.cpp)
27 add_dependencies(myExam01_srv ${${PROJECT_NAME}_EXPORTED_TARGETS} ${catkin_EXPORTED_TARGETS})
28 target_link_libraries(myExam01_srv ${catkin_LIBRARIES})
```

```
add_service_files(FILES SrvGuessNum.srv)
generate_messages(DEPENDENCIES std_msgs)
```

```
add_executable(myExam01_srv src/ myExam01_srv.cpp)
add_dependencies(myExam01_srv ${${PROJECT_NAME}_EXPORTED_TARGETS} ${catkin_EXPORTED_TARGETS})
target_link_libraries(myExam01_srv ${catkin_LIBRARIES})
```

ros node 05

```
find_package(catkin REQUIRED COMPONENTS
  roscpp
  rospy
  std_msgs
  message_generation
)
```

```
add_service_files(FILES SrvGuessNum.srv)
generate_messages(DEPENDENCIES std_msgs)
```

```
add_executable(myExam01_srv src/ myExam01_srv.cpp)
add_dependencies(myExam01_srv ${PROJECT_NAME}_EXPORTED_TARGETS ${catkin_EXPORTED_TARGETS})
target_link_libraries(myExam01_srv ${catkin_LIBRARIES})
```

表示這個程式編譯時有先後
相依問題(**SrvGuessNum.h**)，
無此行則需多編譯數次才可
成功

ros node 06

```
user@user-virtual-machine:~/catkin_ws$ catkin_make
Base path: /home/user/catkin_ws
Source space: /home/user/catkin_ws/src
Build space: /home/user/catkin_ws/build
Devel space: /home/user/catkin_ws/devel
Install space: /home/user/catkin_ws/install
####
#### Running command: "make cmake_check_build_system" in "/home/user/catkin_ws/build"
####
```

```
cd ~/catkin_ws
catkin_make
```

編譯程式

demo

```
user@user-virtual-machine:~$ rosrund finalExam myExam01
Usage: /home/user/catkin_ws/devel/lib/finalExam/myExam01 [Lower_Bound] [Upper_Bound]
user@user-virtual-machine:~$ rosrund finalExam myExam01 10 15
[ INFO] [1716805270.076081493]: ready srv server!
```

roscor

rosrund finalExam myExam01 10 15

```
user@user-virtual-machine:~$ rosservice list
/guess_num_srv
/guess_server/get_loggers
/guess_server/set_logger_level
/rosout/get_loggers
/rosout/set_logger_level
user@user-virtual-machine:~$ rosservice call /guess_num_srv "a: 10"
result: "0)Input:10 too low."
user@user-virtual-machine:~$ rosservice call /guess_num_srv "a: 14"
result: "1)Input:14 too high."
user@user-virtual-machine:~$
```

rosservice list

rosservice call /guess_num_srv 12

期末上機考

Final Exam - 1

參考service_client.cpp

- https://github.com/Waywrong/ros_course/blob/main/ros_tutorials_service/src/service_client.cpp
- 評分以完整度優先
- 時間一小時，後每十分鐘一個區間

計分要素

1. 重現 myExam01_srv (基本分)
2. argc, argv
3. 印出回傳的result
4. 講解程式內容(尤其是修改處)
5. 實驗紀錄word檔(5/31)

注: 其他作業最後收件日5/31

Final Exam - 2

實驗紀錄word檔，包含

- 紀錄所下的命令與回應，可多利用截圖(圖文並茂加分)
 - rosnodet list
 - rostopic list
 - rosservice list
 - rqt_graph
- 意見調查(不計成績，可不填)
 - 課程 收穫 缺點 建議改良
 - 如果還有多一堂課 想學什麼
 - 其他

service_client.cpp 参考

https://github.com/Waywrong/ros_course/blob/main/ros_tutorials_service/src/service_client.cpp

```
#include "ros/ros.h"
#include "ros_tutorials_service/SrvTutorial.h"
#include <cstdlib>
int main(int argc, char **argv)
{
    ros::init(argc, argv, "service_client");
    if (argc != 3)
    {
        ROS_INFO("cmd : rosrune ros_tutorials_service service_client arg0 arg1");
        ROS_INFO("arg0: double number, arg1: double number");
        return 1;
    }
    ros::NodeHandle nh;
    ros::ServiceClient ros_tutorials_service_client =
nh.serviceClient<ros_tutorials_service::SrvTutorial>("ros_tutorial_srv");
```


service_client.cpp 参考

```
ros_tutorials_service::SrvTutorial srv;
srv.request.a = atoll(argv[1]);
srv.request.b = atoll(argv[2]);
if (ros_tutorials_service_client.call(srv))
{
    ROS_INFO("send srv, srv.Request.a and b: %ld, %ld", (long int)srv.request.a, (long
int)srv.request.b);
    ROS_INFO("receive srv, srv.Response.result: %ld", (long int)srv.response.result);
}
else
{
    ROS_ERROR("Failed to call service ros_tutorial_srv");
    return 1;
}
return 0;
}
```