Pr. 5 Debug

2017.4

一个IDE的组成

- 编辑器
- 构建器（编译器+链接器）
- 调试器

先聊聊构建

- 编译方式 → 翻译一本书
- 解释方式 → 同声传译

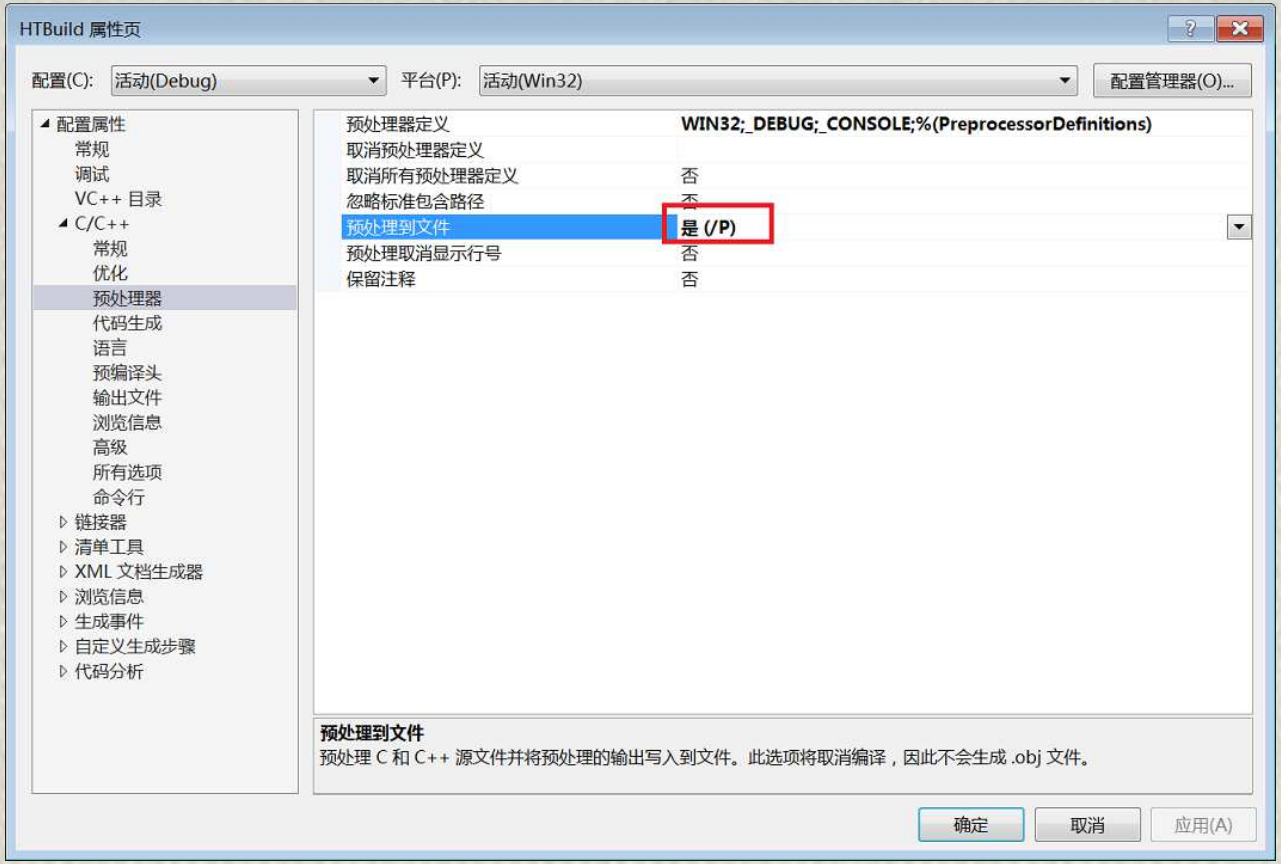
- 构建原理
- 构建方式

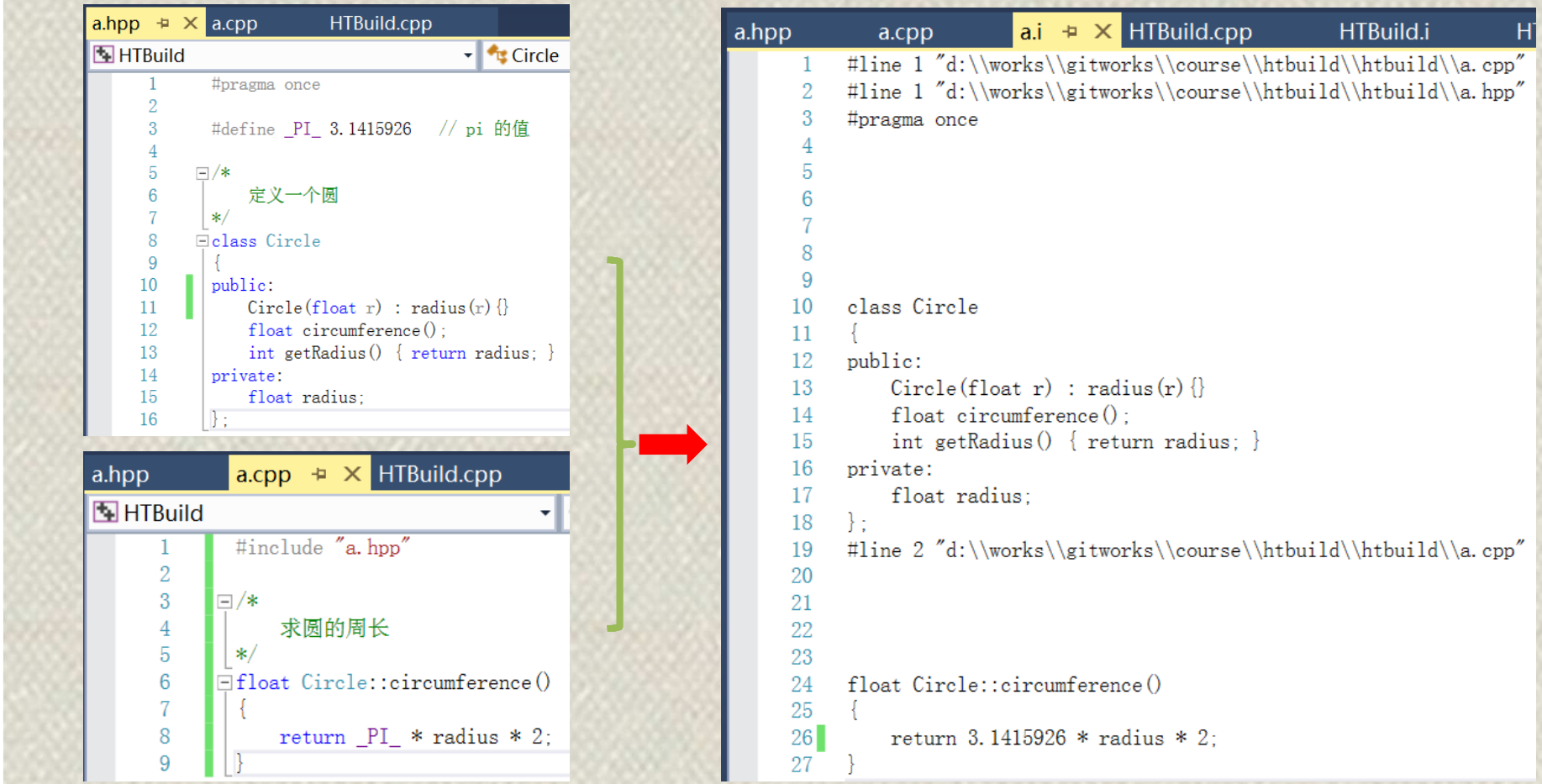
了解代码被处理的过程

- 写代码
- 预处理、预编译
- 编译
- 链接

预处理(Preprocessing)

- 将所有的#define删除，并且展开所有的宏定义
- 处理所有的条件预编译指令，比如#if #ifdef #elif #else #endif等
- 处理**#include** 预编译指令，将被包含的文件插入到该预编译指令的位置
- 删除所有注释“//”和”/* */”
- 添加行号和文件标识，以便编译时产生调试用的行号及编译错误警告行号
- 保留所有的**#pragma**编译器指令，因为编译器需要使用它们，比如警告失效、对奇方式等


HTBuild 属性页
配置(C): 活动(Debug)
平台(P): 活动(Win32)
配置管理器(O)...
配置属性
常规
调试
VC++ 目录
C/C++
常规
优化
预处理器
代码生成
语言
预编译头
输出文件
浏览信息
高级
所有选项
命令行
链接器
清单工具
XML 文档生成器
浏览信息
生成事件
自定义生成步骤
代码分析
预处理器定义 WIN32;_DEBUG;_CONSOLE;%(PreprocessorDefinitions)
取消预处理器定义
取消所有预处理器定义 否
忽略标准包含路径 否
预处理到文件 是 (/P)
预处理取消显示行号 否
保留注释 否
预处理到文件
预处理 C 和 C++ 源文件并将预处理的输出写入到文件。此选项将取消编译，因此不会生成 .obj 文件。
确定
取消
应用(A)


a.hpp
a.cpp
HTBuild.cpp
HTBuild
Circle
#pragma once
#define _PI_ 3.1415926 // pi 的值
/*
定义一个圆
*/
class Circle
{
public:
Circle(float r) : radius(r){}
float circumference();
int getRadius() { return radius; }
private:
float radius;
};
a.hpp
a.cpp
HTBuild.cpp
HTBuild
#include "a.hpp"
/*
求圆的周长
*/
float Circle::circumference()
{
return _PI_ * radius * 2;
}
a.hpp
a.cpp
a.i
HTBuild.cpp
HTBuild.i
#line 1 "d:\\works\\gitworks\\course\\htbuild\\htbuild\\a.cpp"
#line 1 "d:\\works\\gitworks\\course\\htbuild\\htbuild\\a.hpp"
#pragma once
class Circle
{
public:
Circle(float r) : radius(r){}
float circumference();
int getRadius() { return radius; }
private:
float radius;
};
#line 2 "d:\\works\\gitworks\\course\\htbuild\\htbuild\\a.cpp"
float Circle::circumference()
{
return 3.1415926 * radius * 2;
}

a.hpp a.cpp a.i HTBuild.cpp HTBuild.i

HTBuild (全局范围)

```cpp
#include "a.hpp"
#include <iostream>

int main()
{
    Circle c(15);
    printf("result is %f\n", c.circumference());
    return 0;
}
```

a.hpp a.cpp a.i HTBuild.cpp HTBuild.i HTBuild.obj

```cpp
#line 1 "d:\\works\\gitworks\\course\\htbuild\\htbuild\\htbuild.cpp"



#line 1 "d:\\works\\gitworks\\course\\htbuild\\htbuild\\a.hpp"
#pragma once




class Circle
{
public:
    Circle(float r) : radius(r){}
    float circumference();
    int getRadius() { return radius; }
private:
    float radius;
};
#line 6 "d:\\works\\gitworks\\course\\htbuild\\htbuild\\htbuild.cpp"
#line 1 "c:\\program files (x86)\\microsoft visual studio 14.0\\vc\\include\\iostream"


#line 7 "d:\\works\\gitworks\\course\\htbuild\\htbuild\\htbuild.cpp"

int main()
{
    Circle c(15);
    printf("result is %f\n", c.circumference());
    return 0;
}
```

编译

a.hpp | a.cpp | a.i | HTBuild.cpp | HTBuild.i | H

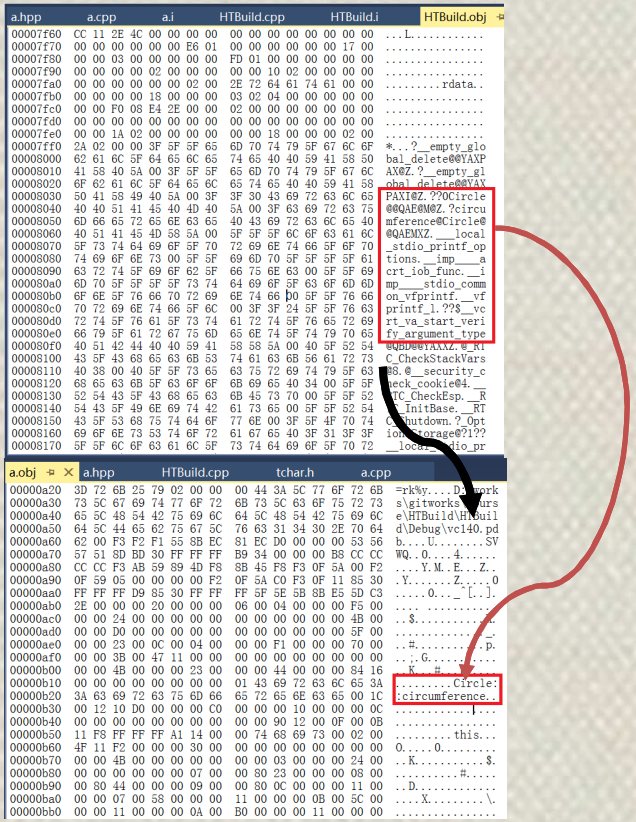
```
1  #line 1 "d:\\works\\gitworks\\course\\htbuild\\htbuild\\a.cpp"
2  #line 1 "d:\\works\\gitworks\\course\\htbuild\\htbuild\\a.hpp"
3  #pragma once
4
5
6
7
8
9
10 class Circle
11 {
12 public:
13     Circle(float r) : radius(r){}
14     float circumference();
15     int getRadius() { return radius; }
16 private:
17     float radius;
18 };
19 #line 2 "d:\\works\\gitworks\\course\\htbuild\\htbuild\\a.cpp"
20
21
22
23
24 float Circle::circumference()
25 {
26     return 3.1415926 * radius * 2;
27 }
```

a.obj | a.hpp | HTBuild.cpp | tchar.h | a.cpp

```
00000a20  3D 72 6B 25 79 02 00 00  00 44 3A 5C 77 6F 72 6B  =rk%y....D:\work
00000a30  73 5C 67 69 74 77 6F 72  6B 73 5C 63 6F 75 72 73  s\gitworks\cours
00000a40  65 5C 48 54 42 75 69 6C  64 5C 48 54 42 75 69 6C  e\HTBuild\HTBuil
00000a50  64 5C 44 65 62 75 67 5C  76 63 31 34 30 2E 70 64  d\Debug\vc140.pd
00000a60  62 00 F3 F2 F1 55 8B EC  81 EC D0 00 00 00 53 56  b....U........SV
00000a70  57 51 8D BD 30 FF FF FF  B9 34 00 00 00 B8 CC CC  WQ..0....4......
00000a80  CC CC F3 AB 59 89 4D F8  8B 45 F8 F3 0F 5A 00 F2  ....Y.M..E...Z..
00000a90  0F 59 05 00 00 00 00 F2  0F 5A C0 F3 0F 11 85 30  .Y.......Z.....0
00000aa0  FF FF FF D9 85 30 FF FF  FF 5F 5E 5B 8B E5 5D C3  .....0..._^[..].
00000ab0  2E 00 00 00 20 00 00 00  06 00 04 00 00 00 F5 00  .... ...........
00000ac0  00 00 24 00 00 00 00 00  00 00 00 00 00 00 4B 00  ..$...........K.
00000ad0  00 00 D0 00 00 00 00 00  00 00 00 00 00 00 5F 00  ..............._.
00000ae0  00 00 23 00 0C 00 04 00  00 00 F1 00 00 00 70 00  ..#...........p.
00000af0  00 00 3B 00 47 11 00 00  00 00 00 00 00 00 00 00  ..;.G...........
00000b00  00 00 4B 00 00 00 23 00  00 00 44 00 00 00 84 16  ..K...#...D.....
00000b10  00 00 00 00 00 00 00 00  01 43 69 72 63 6C 65 3A  .........Circle:
00000b20  3A 63 69 72 63 75 6D 66  65 72 65 6E 63 65 00 1C  :circumference..
00000b30  00 12 10 D0 00 00 00 C0  00 00 00 10 00 00 00 0C  ................
00000b40  00 00 00 00 00 00 00 00  00 00 90 12 00 0F 00 0B  ................
00000b50  11 F8 FF FF FF A1 14 00  00 74 68 69 73 00 02 00  .........this...
00000b60  4F 11 F2 00 00 00 30 00  00 00 00 00 00 00 00 00  O.....0.........
00000b70  00 00 4B 00 00 00 00 00  00 00 03 00 00 00 24 00  ..K...........$.
00000b80  00 00 00 00 00 00 07 00  00 80 23 00 00 00 08 00  ..........#.....
00000b90  00 80 44 00 00 00 09 00  00 80 0C 00 00 00 11 00  ..D.............
00000ba0  00 00 07 00 58 00 00 00  11 00 00 00 0B 00 5C 00  ....X.........\.
00000bb0  00 00 11 00 00 00 0A 00  B0 00 00 00 11 00 00 00  ................
```

链接

- 将不同的obj中的符号建立起联系，调用的时候才能找得到
- “连”和“链”



都调试什么？

- 语法或编译时错误(definition)
- 链接错误(symbols)
- 运行错误(Crash/error)
- 逻辑或意图错误(Wrong/mistake)

调试的方法

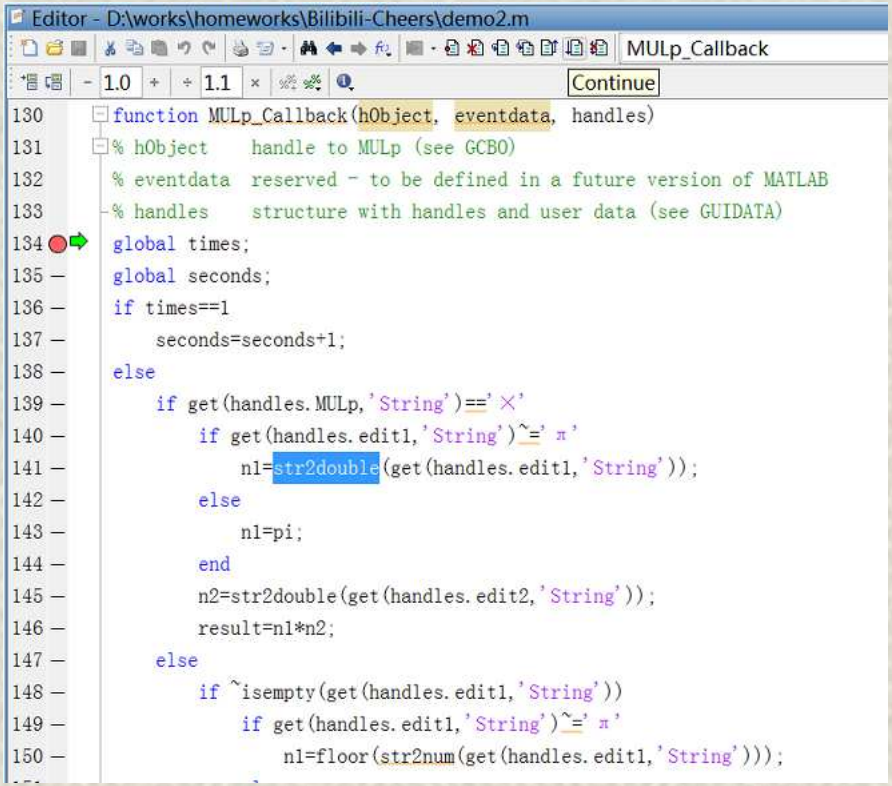
- 屏幕输出信息
- 代码断点调试
- Dump分析调试
- 打日志、收集分析

生产环境哪种方式最好？

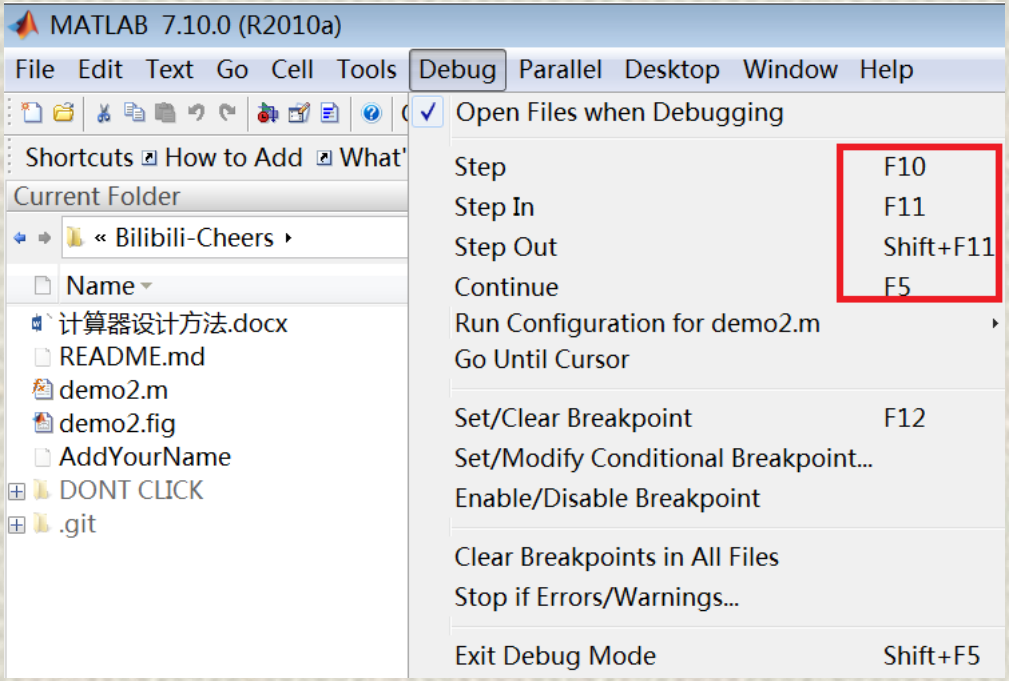
调试过程

- Set/Clear breakpoint
- Step
- Step in
- Step out
- continue

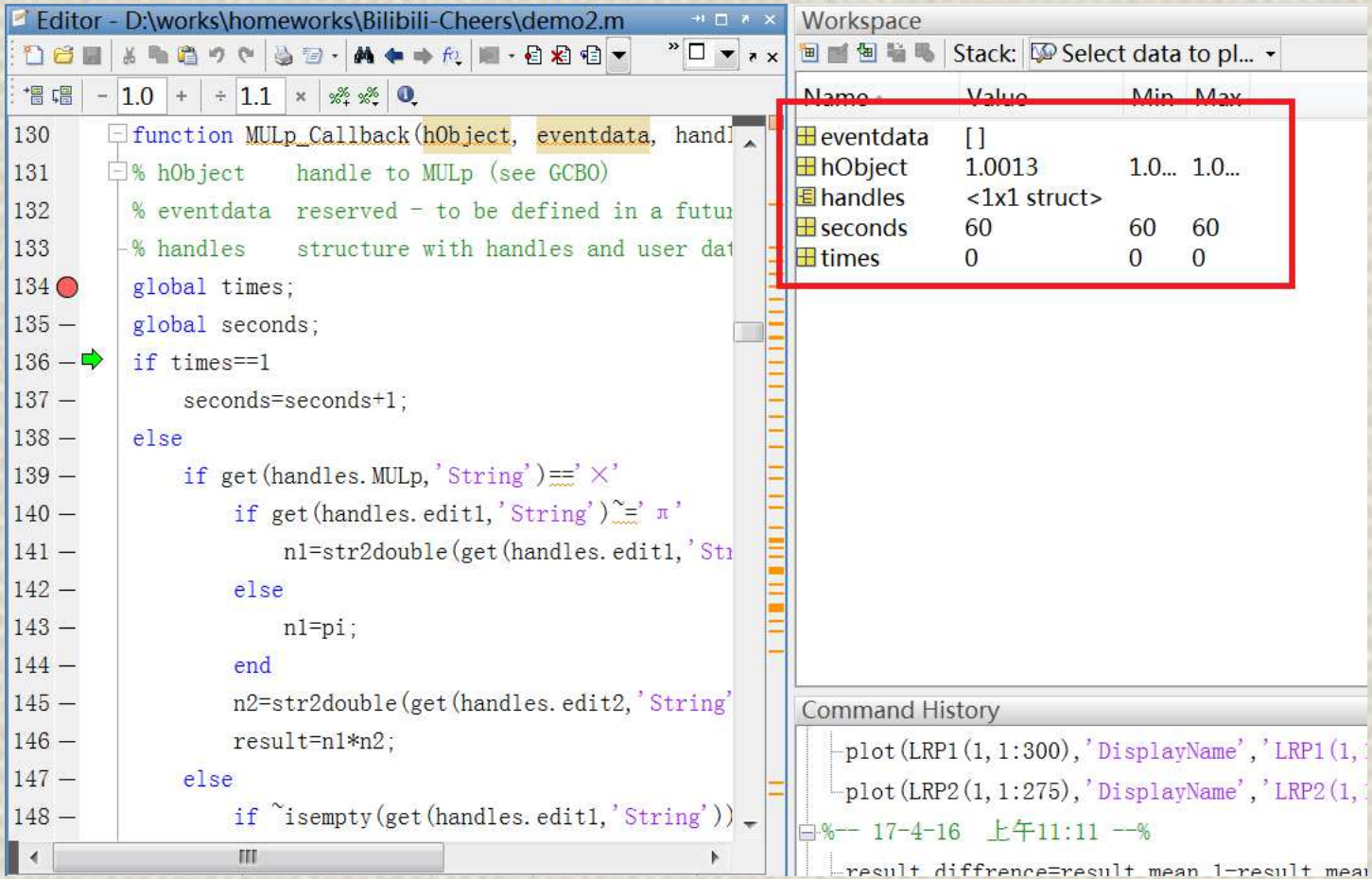
MATLAB


Editor - D:\works\homeworks\Bilibili-Cheers\demo2.m
MULp_Callback
1.0
1.1
Continue
130 function MULp_Callback(hObject, eventdata, handles)
131 % hObject handle to MULp (see GCBO)
132 % eventdata reserved - to be defined in a future version of MATLAB
133 % handles structure with handles and user data (see GUIDATA)
134 global times;
135 global seconds;
136 if times==1
137 seconds=seconds+1;
138 else
139 if get(handles.MULp,'String')=='×'
140 if get(handles.edit1,'String')~='π'
141 n1=str2double(get(handles.edit1,'String'));
142 else
143 n1=pi;
144 end
145 n2=str2double(get(handles.edit2,'String'));
146 result=n1*n2;
147 else
148 if ~isempty(get(handles.edit1,'String'))
149 if get(handles.edit1,'String')~='π'
150 n1=floor(str2num(get(handles.edit1,'String')));

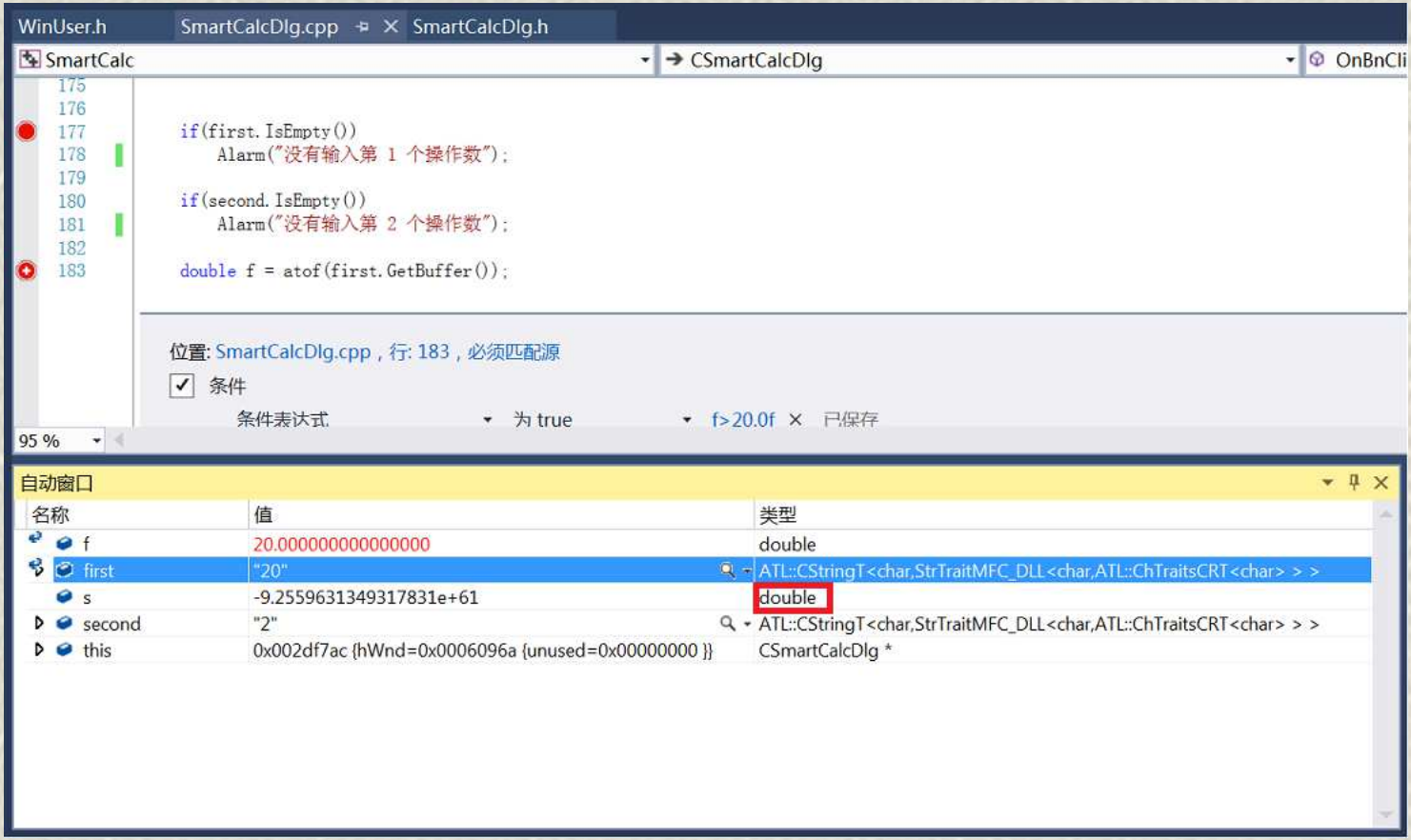
快捷键


MATLAB 7.10.0 (R2010a)
File Edit Text Go Cell Tools Debug Parallel Desktop Window Help
Open Files when Debugging
Shortcuts How to Add What'
Current Folder
« Bilibili-Cheers
Name
计算器设计方法.docx
README.md
demo2.m
demo2.fig
AddYourName
DONT CLICK
.git
Step F10
Step In F11
Step Out Shift+F11
Continue F5
Run Configuration for demo2.m
Go Until Cursor
Set/Clear Breakpoint F12
Set/Modify Conditional Breakpoint...
Enable/Disable Breakpoint
Clear Breakpoints in All Files
Stop if Errors/Warnings...
Exit Debug Mode Shift+F5

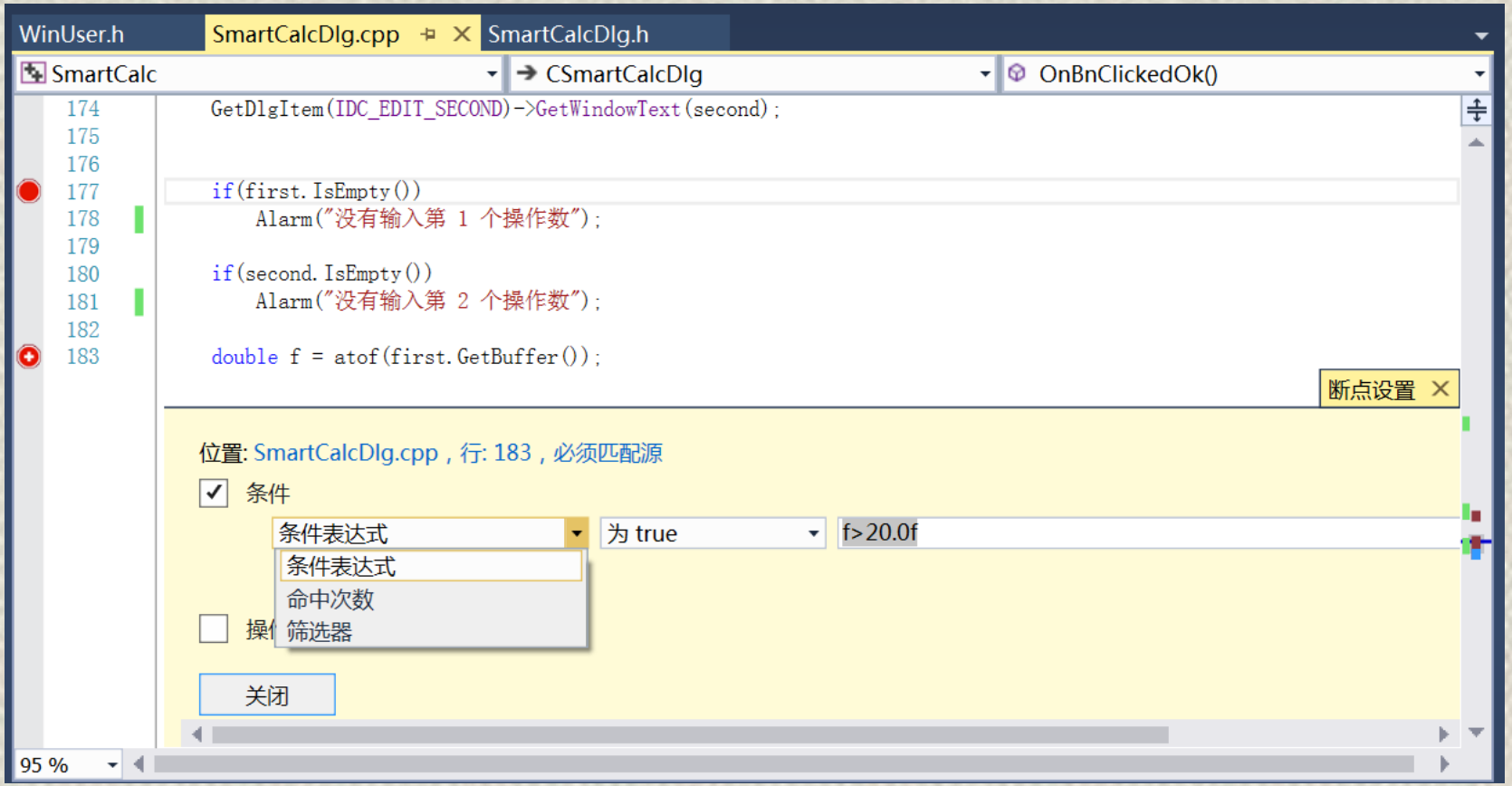
变量跟踪（监视）


Editor - D:\works\homeworks\Bilibili-Cheers\demo2.m
130 function MULp_Callback(hObject, eventdata, handl
131 % hObject handle to MULp (see GCBO)
132 % eventdata reserved - to be defined in a futu
133 % handles structure with handles and user dat
134 global times;
135 global seconds;
136 if times==1
137 seconds=seconds+1;
138 else
139 if get(handles.MULp,'String')=='×'
140 if get(handles.edit1,'String')~='π'
141 n1=str2double(get(handles.edit1,'Str
142 else
143 n1=pi;
144 end
145 n2=str2double(get(handles.edit2,'String'
146 result=n1*n2;
147 else
148 if ~isempty(get(handles.edit1,'String'))
Workspace
Stack: Select data to pl...
Name Value Min Max
eventdata []
hObject 1.0013 1.0... 1.0...
handles <1x1 struct>
seconds 60 60 60
times 0 0 0
Command History
plot(LRP1(1,1:300),'DisplayName','LRP1(1,
plot(LRP2(1,1:275),'DisplayName','LRP2(1,
%-- 17-4-16 上午11:11 --%
result_diffrence=result_mean_1-result_mea

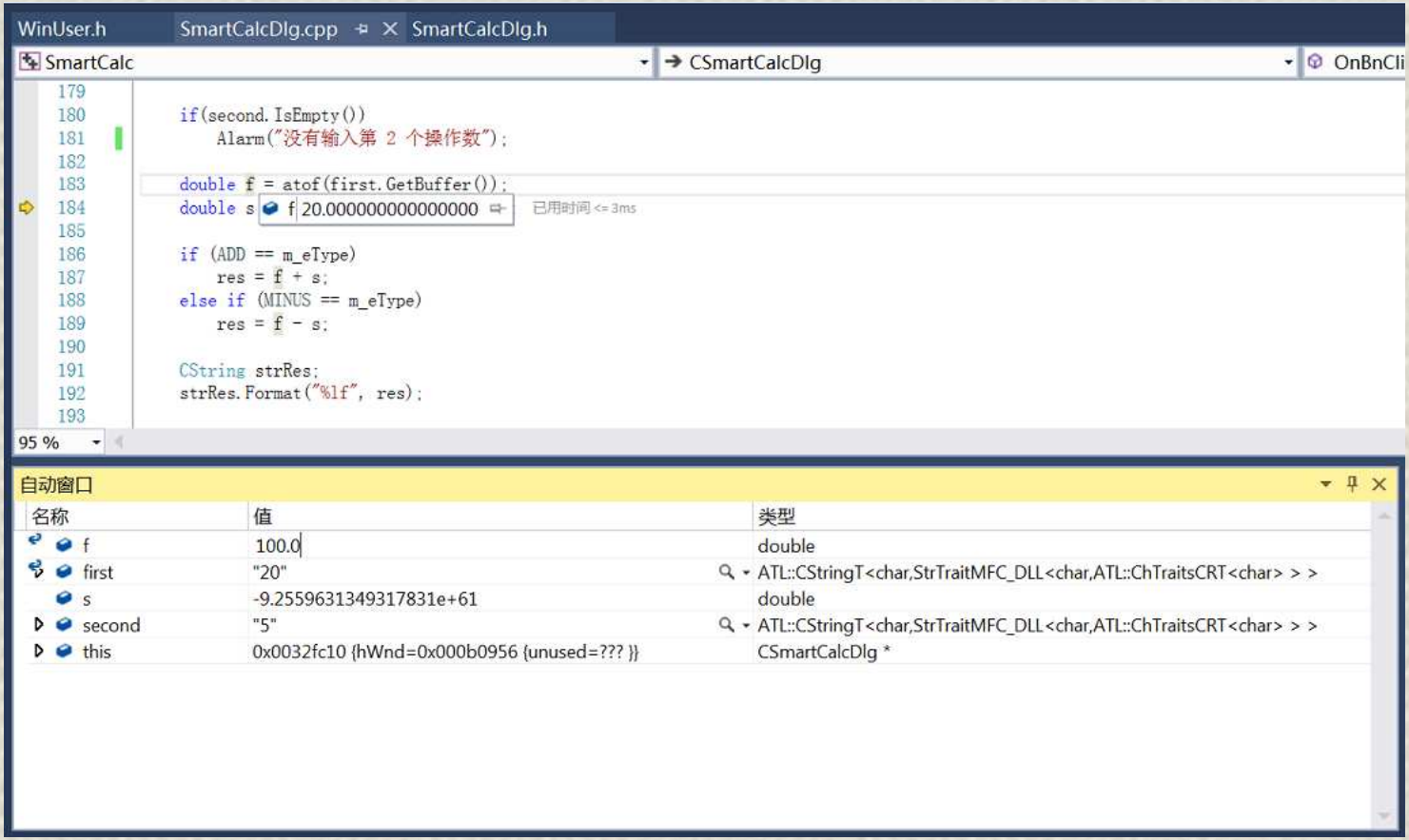
Visual Studio


WinUser.h
SmartCalcDlg.cpp
SmartCalcDlg.h
SmartCalc
CSmartCalcDlg
OnBnCli
175
176
177
178
179
180
181
182
183
if(first.IsEmpty())
Alarm("没有输入第 1 个操作数");
if(second.IsEmpty())
Alarm("没有输入第 2 个操作数");
double f = atof(first.GetBuffer());
位置: SmartCalcDlg.cpp，行: 183，必须匹配源
条件
条件表达式
为 true
f>20.0f
已保存
95 %
自动窗口
名称
值
类型
f
20.000000000000000
double
first
"20"
ATL::CStringT<char,StrTraitMFC_DLL<char,ATL::ChTraitsCRT<char> > >
s
-9.2559631349317831e+61
double
second
"2"
ATL::CStringT<char,StrTraitMFC_DLL<char,ATL::ChTraitsCRT<char> > >
this
0x002df7ac {hWnd=0x0006096a {unused=0x00000000 }}
CSmartCalcDlg *

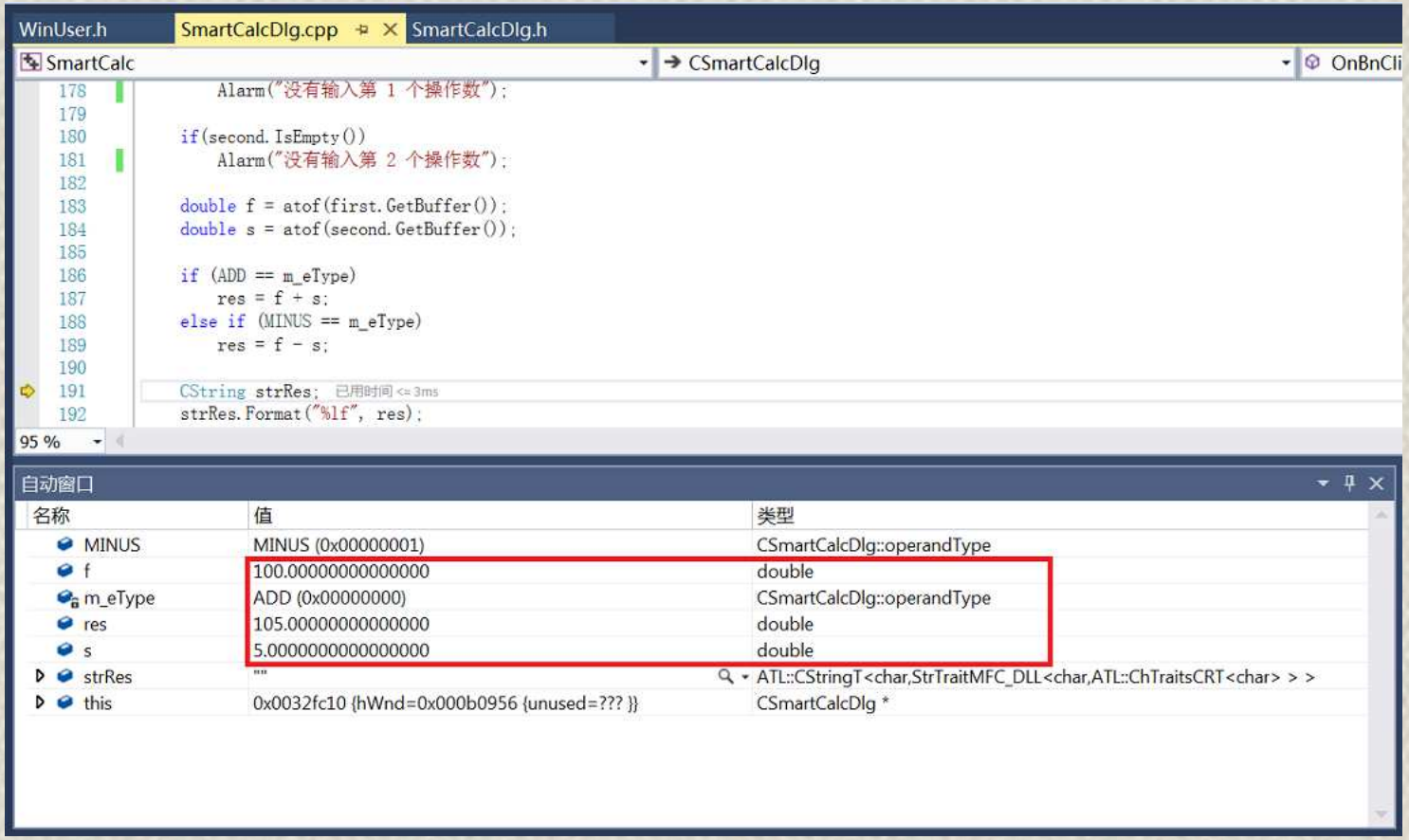
条件断点


WinUser.h
SmartCalcDlg.cpp
SmartCalcDlg.h
SmartCalc
CSmartCalcDlg
OnBnClickedOk()
174 GetDlgItem(IDC_EDIT_SECOND)->GetWindowText(second);
175
176
177 if(first.IsEmpty())
178 Alarm("没有输入第 1 个操作数");
179
180 if(second.IsEmpty())
181 Alarm("没有输入第 2 个操作数");
182
183 double f = atof(first.GetBuffer());
断点设置
位置: SmartCalcDlg.cpp，行: 183，必须匹配源
条件
条件表达式
为 true
f>20.0f
条件表达式
命中次数
筛选器
关闭
95 %

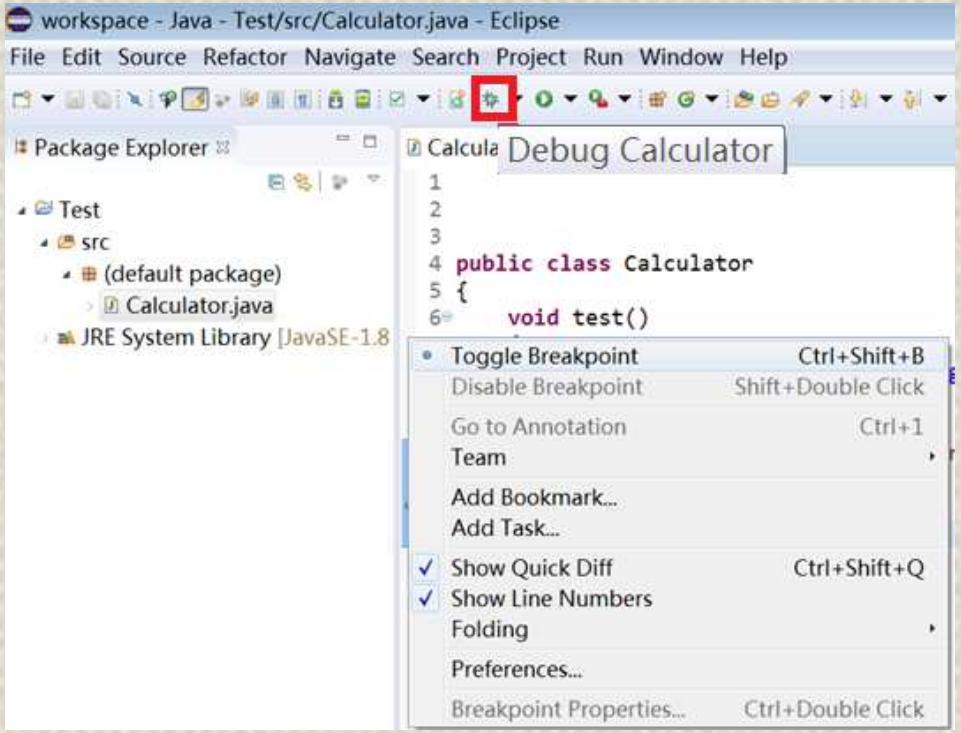
更改


WinUser.h
SmartCalcDlg.cpp
SmartCalcDlg.h
SmartCalc
CSmartCalcDlg
OnBnCli
179
180 if(second.IsEmpty())
181 Alarm("没有输入第 2 个操作数");
182
183 double f = atof(first.GetBuffer());
184 double s f 20.000000000000000 已用时间 <= 3ms
185
186 if (ADD == m_eType)
187 res = f + s;
188 else if (MINUS == m_eType)
189 res = f - s;
190
191 CString strRes;
192 strRes.Format("%lf", res);
193
95 %
自动窗口
名称 值 类型
f 100.0 double
first "20" ATL::CStringT<char,StrTraitMFC_DLL<char,ATL::ChTraitsCRT<char> > >
s -9.2559631349317831e+61 double
second "5" ATL::CStringT<char,StrTraitMFC_DLL<char,ATL::ChTraitsCRT<char> > >
this 0x0032fc10 {hWnd=0x000b0956 {unused=??? }} CSmartCalcDlg *

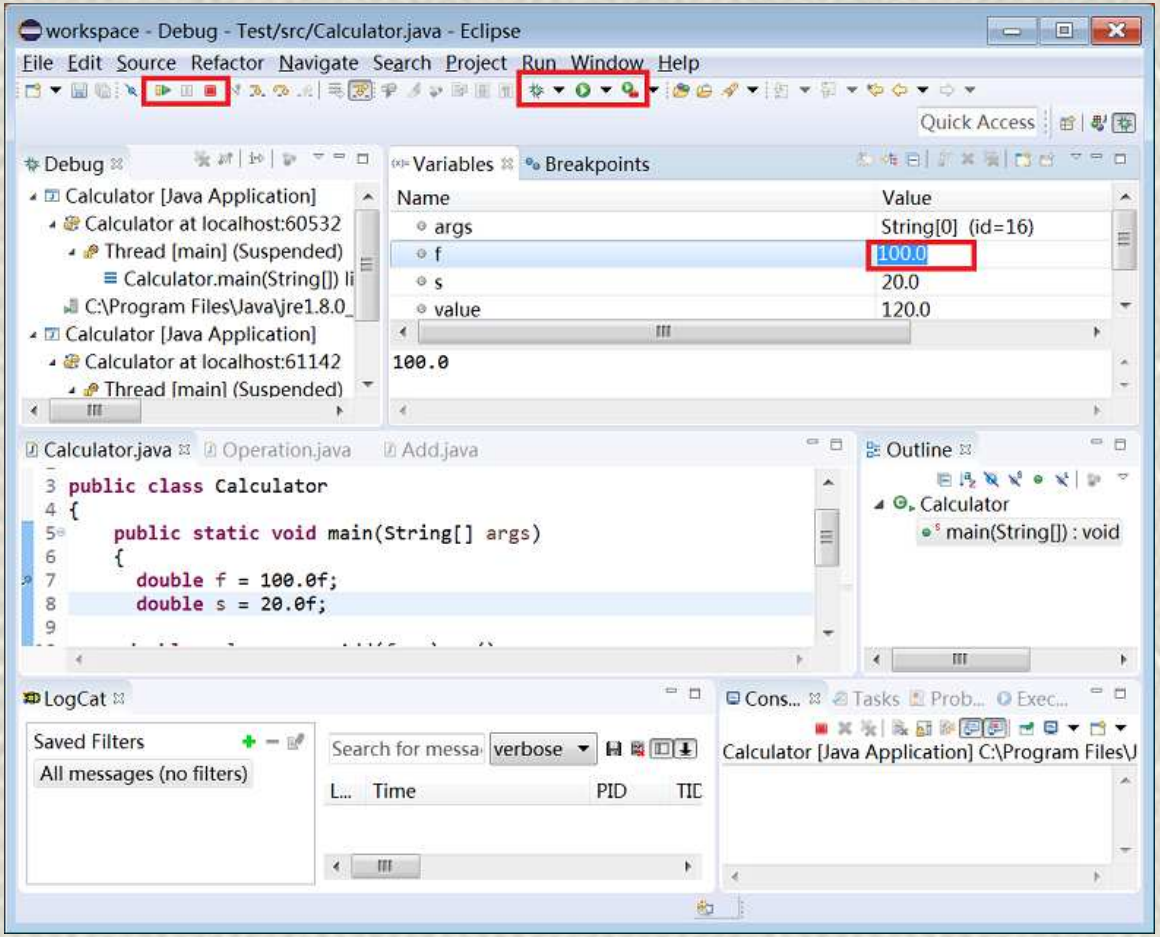
更改后


WinUser.h
SmartCalcDlg.cpp
SmartCalcDlg.h
SmartCalc
CSmartCalcDlg
OnBnCli
178 Alarm("没有输入第 1 个操作数");
179
180 if(second.IsEmpty())
181 Alarm("没有输入第 2 个操作数");
182
183 double f = atof(first.GetBuffer());
184 double s = atof(second.GetBuffer());
185
186 if (ADD == m_eType)
187 res = f + s;
188 else if (MINUS == m_eType)
189 res = f - s;
190
191 CString strRes; 已用时间 <= 3ms
192 strRes.Format("%lf", res);
95 %
自动窗口
名称
值
类型
MINUS
MINUS (0x00000001)
CSmartCalcDlg::operandType
f
100.00000000000000
double
m_eType
ADD (0x00000000)
CSmartCalcDlg::operandType
res
105.00000000000000
double
s
5.0000000000000000
double
strRes
""
ATL::CStringT<char,StrTraitMFC_DLL<char,ATL::ChTraitsCRT<char> > >
this
0x0032fc10 {hWnd=0x000b0956 {unused=??? }}
CSmartCalcDlg *

Eclipse



- F8：运行到下一个断点
- F5：单步调试进入函数内部
- F6：单步调试不进入函数内部
- F7：由函数内部返回到调用处


workspace - Debug - Test/src/Calculator.java - Eclipse
File Edit Source Refactor Navigate Search Project Run Window Help
Quick Access
Debug
Calculator [Java Application]
Calculator at localhost:60532
Thread [main] (Suspended)
Calculator.main(String[]) li
C:\Program Files\Java\jre1.8.0_
Calculator [Java Application]
Calculator at localhost:61142
Thread [main] (Suspended)
Variables
Breakpoints
Name
Value
args
String[0] (id=16)
f
100.0
s
20.0
value
120.0
100.0
Calculator.java
Operation.java
Add.java
3 public class Calculator
4 {
5 public static void main(String[] args)
6 {
7 double f = 100.0f;
8 double s = 20.0f;
9
Outline
Calculator
main(String[]) : void
LogCat
Saved Filters
All messages (no filters)
Search for messa
verbose
L... Time PID TID
Cons...
Tasks
Prob...
Exec...
Calculator [Java Application] C:\Program Files\J

高级玩法

- 调试“库”
- Dump调试
- 远程调试