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My Awesome Book

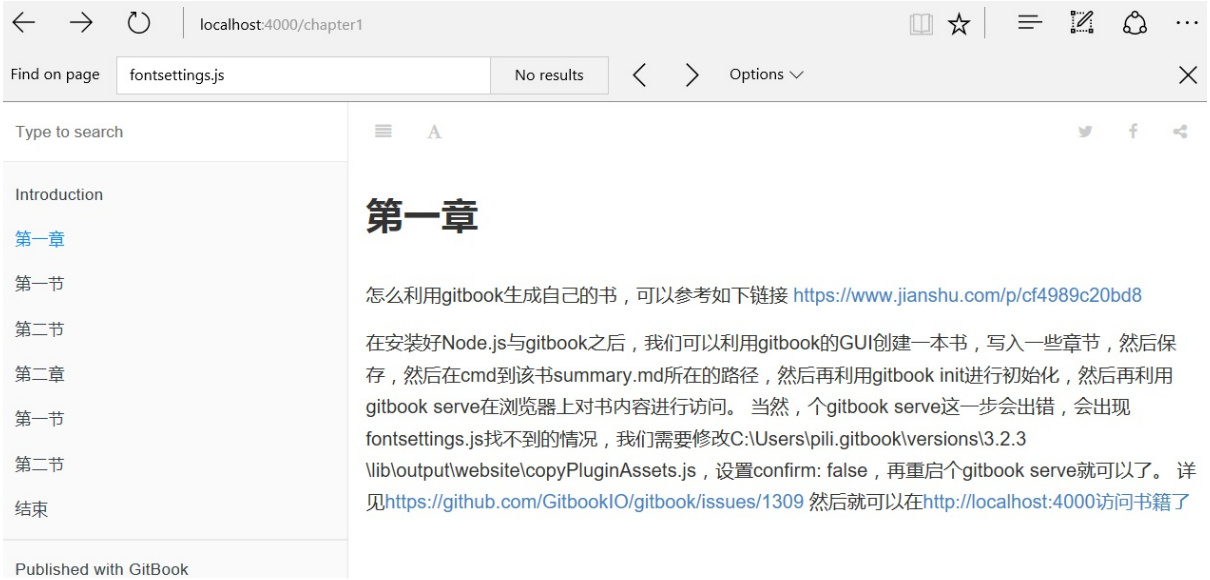
日知录是为效法顾炎武的《日知录》而做，里面会记录自己在学习与工作中学到的东西，该书的目的是为了打造一本属于自己的百科全书，也是自己思想体系的体现。最终里面的每一章可能代表一个方向与学科，比如C++，C#最终会成为一章，经济，中国史会成为一章。如果经济学里面记录的内容不多，就编成一章，如果内容多了，则会编成多章，比如宏观经济学，微观经济学，计量经济学。这样，最终一门大的学科，比如，经济学，就编成了一卷。

第一章:工具

第一节 Gitbook的安装与使用

Gitbook是Github旗下的产品，它提供书籍的编写与管理的功能，一个核心特征就是，它管理书也像管理代码一样，可以对数据进行fork,建立新的branch,使得书也可以进行版本迭代。也可以与多人合作，来编辑，更新书籍，适合单人创作或者多人共同创作。怎么利用gitbook生成自己的书，可以参考如下链接 https://www.jianshu.com/p/cf4989c20bd8 https://www.cnblogs.com/Lam7/p/6109872.html

在安装好Node.js与gitbook之后，我们可以利用gitbook的GUI创建一本书，写入一些章节，然后保存，然后在cmd到该书summary.md所在的路径，然后再利用gitbook init进行初始化，然后再利用gitbook serve在浏览器上对书内容进行访问。当然，个gitbook serve这一步会出错，会出现fontsettings.js找不到的情况，我们需要修改C:\Users\pili.gitbook\versions\3.2.3\lib\output\website\copyPluginAssets.js，设置confirm: false，再重启个gitbook serve就可以了。详见https://github.com/GitbookIO/gitbook/issues/1309 然后就可以在 http://localhost:4000 访问书籍了

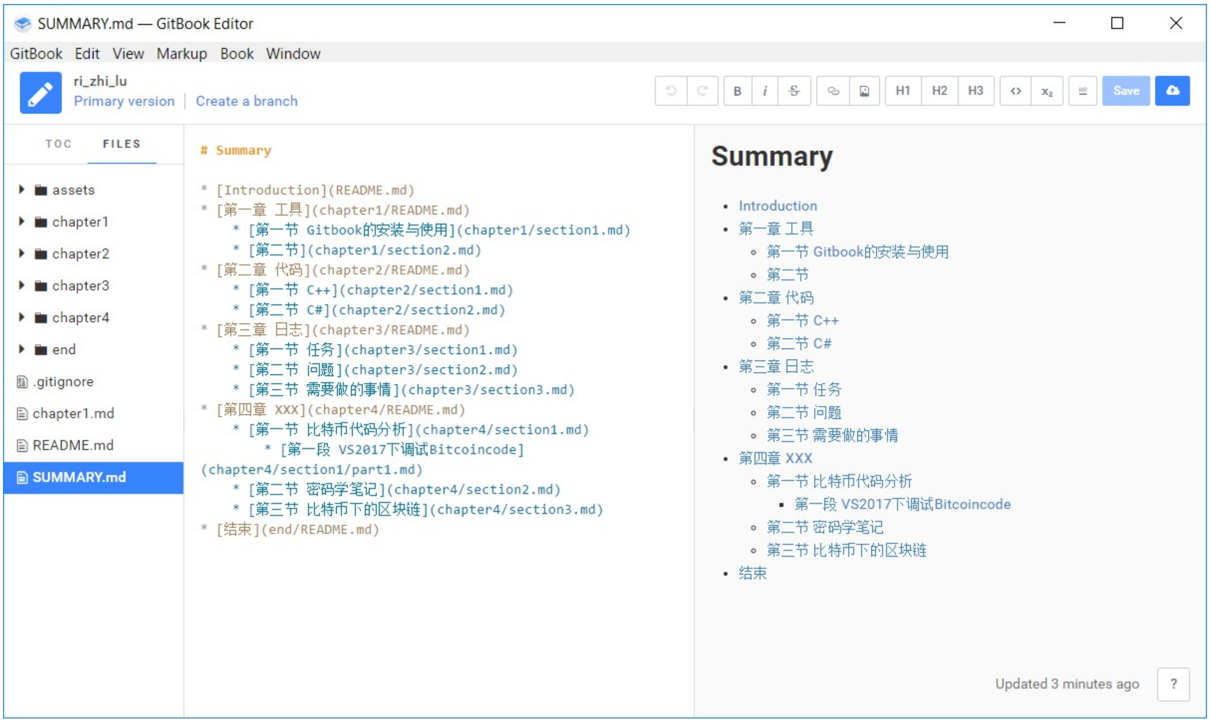


第一章

怎么利用gitbook生成自己的书，可以参考如下链接 https://www.jianshu.com/p/cf4989c20bd8

在安装好Node.js与gitbook之后，我们可以利用gitbook的GUI创建一本书，写入一些章节，然后保存，然后在cmd到该书summary.md所在的路径，然后再利用gitbook init进行初始化，然后再利用gitbook serve在浏览器上对书内容进行访问。 当然，个gitbook serve这一步会出错，会出现fontsettings.js找不到的情况，我们需要修改C:\Users\pili.gitbook\versions\3.2.3\lib\output\website\copyPluginAssets.js，设置confirm: false，再重启个gitbook serve就可以了。 详见https://github.com/GitbookIO/gitbook/issues/1309 然后就可以在http://localhost:4000访问书籍了

如果想让章节有层次感的显示，则可以在summary.md中设置



```
# Summary

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```

Summary

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第二节 编辑数学公式

可以参考https://598753468.gitbooks.io/tex/content/fei_xian_xing_fu_hao.html
数学公式的编辑类似于Latex.

需要安装mathjax

```
npm install mathjax
安装特定版本的npm install mathjax@2.6.1
```

首先在书籍project的最顶成新建一个book.json,内容如下

```
{
    "gitbook": "3.2.3",
    "plugins": ["mathjax"],
    "links": {
        "sidebar": {
            "Contact us / Support": "https://www.gitbook.com/contact"
        }
    },
    "pluginsConfig": {
    "mathjax":{
            "forceSVG": true
        }
        }
}
```

然后再用gitbook install命令安装mathjax

gitbook pdf ./ mybook.pdf（./ mybook.pdf 之间有空格）

http://ldehai.com/blog/2016/11/30/write-with-gitbook/

no such file fontsettings.js

第二章:日志

```
int main(int argc, char* argv[])
{
    SetupEnvironment();

    // Connect bitcoind signal handlers
    noui_connect();

    return (AppInit(argc, argv) ? EXIT_SUCCESS : EXIT_FAILURE);
}
```

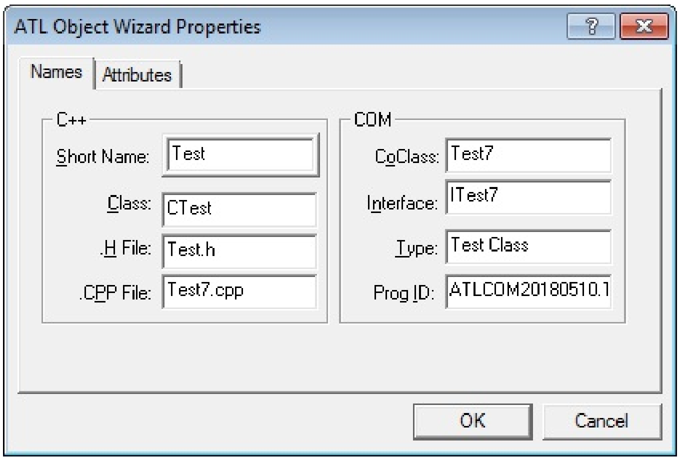
第一节 C++

接口：即抽象类，就是包含至少一个纯虚函数的类

```
一个类里面实现多种接口Iinterface, IinterfaceB, IinterfaceC
    IE84TPTimeOutUIAck : public IUnknown
    {
    public:
        virtual HRESULT STDMETHODCALLTYPE ResponseTpTimeOutUIAck(
            /* [in] */ short nPortNo,
            /* [in] */ short nTpNo) = 0;

    };
```

New ATL object 时，选择simple object，然后属性设置如下：则可以实现一个类中有多组接口函数。


ATL Object Wizard Properties

C++

Short Name: Test

Class: CTest

.H File: Test.h

.CPP File: Test7.cpp

COM

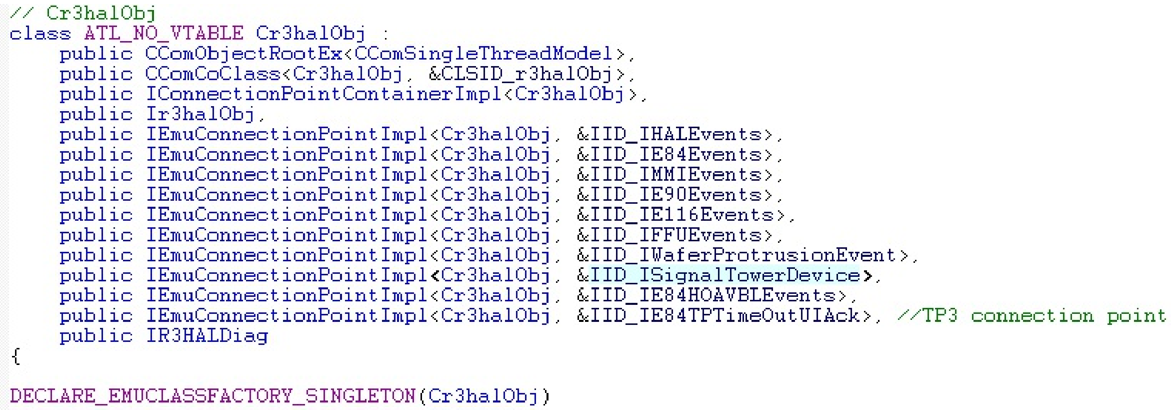
CoClass: Test7

Interface: ITest7

Type: Test Class

Prog ID: ATLCOM20180510.1

C++通过ATL来实现接口的继承。


```
// Cr3halObj
class ATL_NO_VTABLE Cr3halObj :
    public CComObjectRootEx<CComSingleThreadModel>,
    public CComCoClass<Cr3halObj, &CLSID_r3halObj>,
    public IConnectionPointContainerImpl<Cr3halObj>,
    public Ir3halObj,
    public IEmuConnectionPointImpl<Cr3halObj, &IID_IHALEvents>,
    public IEmuConnectionPointImpl<Cr3halObj, &IID_IE84Events>,
    public IEmuConnectionPointImpl<Cr3halObj, &IID_IMMIEvents>,
    public IEmuConnectionPointImpl<Cr3halObj, &IID_IE90Events>,
    public IEmuConnectionPointImpl<Cr3halObj, &IID_IE116Events>,
    public IEmuConnectionPointImpl<Cr3halObj, &IID_IFFUEvents>,
    public IEmuConnectionPointImpl<Cr3halObj, &IID_IWaferProtrusionEvent>,
    public IEmuConnectionPointImpl<Cr3halObj, &IID_ISignalTowerDevice>,
    public IEmuConnectionPointImpl<Cr3halObj, &IID_IE84HOAVBLEvents>,
    public IEmuConnectionPointImpl<Cr3halObj, &IID_IE84TPTimeOutUIAck>, //TP3 connection point
    public IR3HALDiag
{
DECLARE_EMUCLASSFACTORY_SINGLETON(Cr3halObj)
```

COM组件接口继承的实现 https://blog.csdn.net/dingbaosheng/article/details/624504

TL学习笔记03

第二节 C#基本知识

```
Linq 语句
q = from sl in m_cassette.slot_descs
     where sl.slot_seq == i
     orderby sl.recipe_seq ascending
     select sl;
```

```
C#委托
Action<int, string, string> dr = this.OnFinishedLoadingWaferInternal;
    this.Invoke(dr, new object[] { slot, waferID, lotID });

http://www.cnblogs.com/akwwl/p/3232679.html
Delegate至少0个参数，至多32个参数，可以无返回值，也可以指定返回值类型
Func可以接受0个至16个传入参数，必须具有返回值
Action可以接受0个至16个传入参数，无返回值
Predicate只能接受一个传入参数，返回值为bool类型
```

```
 Mutex的使用
 // Summary:
        //     Initializes a new instance of the System.Threading.Mutex class with a Boolean
        //     value that indicates whether the calling thread should have initial ownership
        //     of the mutex, a string that is the name of the mutex, and a Boolean value that,
        //     when the method returns, indicates whether the calling thread was granted initial
        //     ownership of the mutex.
        //
        // Parameters:
        //   initiallyOwned:
        //     true to give the calling thread initial ownership of the named system mutex if
        //     the named system mutex is created as a result of this call; otherwise, false.
        //
        //   name:
        //     The name of the System.Threading.Mutex. If the value is null, the System.Threading.Mutex
        //     is unnamed.
        //
        //   createdNew:
        //     When this method returns, contains a Boolean that is true if a local mutex was
        //     created (that is, if name is null or an empty string) or if the specified named
        //     system mutex was created; false if the specified named system mutex already existed.
        //     This parameter is passed uninitialized.
        //
        // Exceptions:
        //   T:System.UnauthorizedAccessException:
        //     The named mutex exists and has access control security, but the user does not
        //     have System.Security.AccessControl.MutexRights.FullControl.
        //
        //   T:System.IO.IOException:
        //     A Win32 error occurred.
        //
        //   T:System.Threading.WaitHandleCannotBeOpenedException:
        //     The named mutex cannot be created, perhaps because a wait handle of a different
        //     type has the same name.
        //
        //   T:System.ArgumentException:
        //     name is longer than 260 characters.
        [ReliabilityContract(Consistency.WillNotCorruptState, Cer.MayFail)]
        [SecurityCritical]
        public Mutex(bool initiallyOwned, string name, out bool createdNew);
        var mutex = new Mutex(false, RS7.IF.CommonFunction.CommonString.MutexName, out createdNew);
```

```
as 的用法
IModuleCommonInterface iMagnet = MagnetSystem.GetInstance as IModuleCommonInterface;
is : 检查一个对象是否兼容于其他指定的类型,并返回一个Bool值,永远不会抛出异常
object o = new object();
        if (o is Label)
         {
             Label lb = (Label)o;
             Response.Write("类型转换成功");
         }
         else
         {
             Response.Write("类型转换失败");
         }
as:与强制类型转换是一样的,但是永远不会抛出异常,即如果转换不成功,会返回null
object o = new object();
         Label lb = o as Label;
         if (lb == null)
         {
             Response.Write("类型转换失败");
         }
         else
         {
             Response.Write("类型转换成功");
         }
```

```
Event
public static event EventHandler<NexusWaferLocationEventArgs> WaferLocationEvent
        {
            add { m_waferLocationEvent += value; }
            remove { m_waferLocationEvent -= value; }
        }
```

```
UserControl是C#在做Windows窗体应用程序时，经常用到的一个控件。他和Form一样，是一个展示型的控件。
本文介绍下Usercontrol在开发中常用的一些属性和方法。
```

```
C# 用Linq的方式实现对Xml文件的基本操作(创建xml文件、增删改查xml文件节点信息)
https://www.cnblogs.com/mingmingruyuedlut/archive/2011/01/27/1946239.html
https://blog.csdn.net/songyi160/article/details/50824274
```

```
接口使用interface 关键字进行定义，可由方法、属性、事件、索引器或这四种成员类型的任意组合构成。
接口的特性：
1.接口类似于抽象基类，不能直接实例化接口;接口中的方法都是抽象方法，实现接口的任何非抽象类型都必须实现接口的所有成员：
当显式实现该接口的成员时，实现的成员不能通过类实例访问，只能通过接口实例访问。
当隐式实现该接口的成员时，实现的成员可以通过类实例访问，也可以通过接口实例访问，但是实现的成员必须是公有的。
2.接口不能包含常量、字段、运算符、实例构造函数、析构函数或类型、不能包含静态成员。
3.接口成员是自动公开的，且不能包含任何访问修饰符。
4.接口自身可从多个接口继承，类和结构可继承多个接口，但接口不能继承类。
```

```
Lamda 表达式
To create a lambda expression, you specify input parameters (if any) on the left side of the lambda operator
```

```
=>,
and you put the expression or statement block on the other side. For example, the lambda expression x => x *
x
specifies a parameter that’s named x and returns the value of x squared. You can assign this expression to a
delegate type, as the following example shows:
delegate int del(int i);
static void Main(string[] args)
{
    del myDelegate = x => x * x;
    int j = myDelegate(5); //j = 25
}
public bool FloatTopLayer
{
    get => ForwardParameters.GetParameterValue<bool>(CalculationParameters.Names.JxRA_FLOAT_TOP_LAYER, true);
    set => ForwardParameters.SetParameterValue<bool>(CalculationParameters.Names.JxRA_FLOAT_TOP_LAYER, value)
;
}
```

```
在泛型类和泛型方法中产生的一个问题是，在预先未知以下情况时，如何将默认值分配给参数化类型 T：
T 是引用类型还是值类型。
如果 T 为值类型，则它是数值还是结构。
给定参数化类型 T 的一个变量 t，只有当 T 为引用类型时，语句 t = null 才有效；只有当 T 为数值类型而不是结构时，
语句 t = 0 才能正常使用。 解决方案是使用 default 关键字，此关键字对于引用类型会返回 null，对于数值类型会返回零。
对于结构，此关键字将返回初始化为零或 null 的每个结构成员，具体取决于这些结构是值类型还是引用类型。
对于可以为 null 的值类型，默认返回 System.Nullable(Of T)，它像任何结构一样初始化
public class GenericList<T> {
    private class Node {
        public Node next;
        public T Data;
    }
    private Node head;
    public T GetFirst() {
        T temp = default(T);
        if(head != null) {
            temp = head.data;
        }
        return temp
    }
}
```

```
为控件添加权限
1.让需要设置权限的控件继承一个接口IUserManagement，这个接口就只有一个方法OnUpdateUserChange，
这个方法里面处理不同用户的权限。
public void OnUpdateUserChange(UserLevel userLevel)
        {
            if (userLevel == UserLevel.USER_ADMIN)
            {
                btAdd.Enabled = true;
                btEdit.Enabled = true;
                btDelete.Enabled = true;
            }
            else if (userLevel == UserLevel.USER_ENGINEER)
            {
                btAdd.Enabled = true;
                btEdit.Enabled = true;
                btDelete.Enabled = true;
            }
            else
            {
                btAdd.Enabled = false;
                btEdit.Enabled = false;
                btDelete.Enabled = false;
            }
        }

private List<IUserManagement> m_lsUser = new List<IUserManagement>();
//User Management 把不同控件添加到m_lsUser
m_iuserManageContainer.AddModule(m_treeView);
m_iuserManageContainer.AddModule(m_sysConfigEditorCtrl);
m_iuserManageContainer.AddModule(m_probeLibraryMainDlg);
m_iuserManageContainer.AddModule(m_defaultRecipeCtrl);
m_iuserManageContainer.AddModule(m_userManagementDlg);
m_iuserManageContainer.AddModule(m_rawDataExplorer);
m_iuserManageContainer.AddModule(this);
m_iuserManageContainer.OnUpdateUserChange();

void AddModule(IUserManagement user){m_lsUser.Add(user);}
然后调用每个控件自己的OnUpdateUserChange函数
public void OnUpdateUserChange()
{
    foreach (var item in m_lsUser)
    {
        item.OnUpdateUserChange(USERLEVEL);
    }
}
```

```
 C#中，使用ServiceController类控制windows服务，使用之前要先添加引用：System.ServiceProcess，
 然后在命名空间中引用：using System.ServiceProcess。
private void StartService()
{
    this._controller = new ServiceController("ServicesName");
    this._controller.Start();
    this._controller.WaitForStatus(ServiceControllerStatus.Running);
    this._controller.Close();
}
```

```
C#委托和事件(Delegate、Event、EventHandler、EventArgs)
https://www.cnblogs.com/Scl891004X/p/6142917.html
```

```
事件
class Events : IDrawingObject
{
    event EventHandler PreDrawEvent;

    event EventHandler IDrawingObject.OnDraw
    {
        add
        {
            lock (PreDrawEvent)
            {
                PreDrawEvent += value;
            }
        }
        remove
        {
            lock (PreDrawEvent)
            {
                PreDrawEvent -= value;
            }
        }
    }

}
```

```
value是c#中的“属性”
例如c#某个类中有一个成员变量(字段)，为了安全性，外部如果要访问它，必须通过“属性”来访问：
private int _id;//这是一个成员变量，private表示是私有的，外部不可访问

public int ID
{
     set { _id = value; } //value就是外部为“属性”ID所赋的值

     get { return _id; } //当外部访问“属性”ID时，返回id的值

}

上下文关键字 value 用在普通属性声明的 set 访问器中。 此关键字类似于方法的输入参数
```

```
 DllImport是System.Runtime.InteropServices命名空间下的一个属性类，其功能是提供从非托管DLL导出的函数的必要调用信息。
 DllImport属性应用于方法，要求最少要提供包含入口点的dll的名称。
 DllImport的定义如下：
[AttributeUsage(AttributeTargets.Method)]
     public class DllImportAttribute: System.Attribute
     {
      public DllImportAttribute(string dllName) {…} //定位参数为dllName
      public CallingConvention CallingConvention; //入口点调用约定
      public CharSet CharSet;                                //入口点采用的字符接
      public string EntryPoint;                               //入口点名称
      public bool ExactSpelling;                             //是否必须与指示的入口点拼写完全一致，默认false
      public bool PreserveSig;                               //方法的签名是被保留还是被转换
      public bool SetLastError;                               //FindLastError方法的返回值保存在这里
      public string Value { get {…} }
     }
[DllImport("mpi.dll", EntryPoint = "setMFCmode", CallingConvention = CallingConvention.Cdecl)]     internal s
tatic extern void setMFCmode();
[DllImport("mpi.dll", EntryPoint = "ver", CallingConvention = CallingConvention.Cdecl)]            internal s
tatic extern StringBuilder ver(int print);
[DllImport("mpi.dll", EntryPoint = "openDCE", CallingConvention = CallingConvention.Cdecl)]        internal s
tatic extern IntPtr openDCE(string pwdin, string cnfname);
```

第三章 日志

第一节 任务

1. 20180508
   1. Debug Miura 以对miura整体架构有个了解，知道哪些是硬件，哪些是与硬件无关
   2. 中段目的是抽离出一个与Miura机器无关的通用平台
   3. 最终目的是把RS塞进这个通用平台，也就是把RS建立在这个通用的平台之上
   4. Boost 库中有uBLAS——Boost 线性代数基础程序库，因此，C++涉及矩阵运算的可以调用这个库。
      1. 自己加工下，但是要考虑跨平台的问题，因此不能封装成dll
2. 20180509
   1. 通过Miura提炼出通用的模板（类似于基类），那么通用的模板应该包含哪些东西？这是核心的问题。

第二节 问题项目:

基础线性代数库

1. 2D插值
    - i. 基于拟合公式，而拟合公式就是1D插值
    - ii. 第一个，实现克里金插值
2. 版本的迭代问题，每次也不求代码很完善，一次次测试与迭代，在过程中追求完美。
    - i. 每个版本要说明改进的地方，为啥要改
    - ii. https://github.com/lbbc1117/Nacho
    - iii. 矩阵求逆需要记下一些notes或者文档。
        - i. 这些只是一些练习，真实的可能会调用一些现成的库。目的是练练C++，也是为以后工作备用
    - iv. SVD 求解论文
        - i. http://people.duke.edu/~hpgavin/SystemID/References/Golub+Reinsch-NM-1970.pdf
    - v. **Armadillo** C++ library for linear algebra scientific computing http://arma.sourceforge.net/
        - i. https://github.com/conradsnicta/armadillo-code/
        - ii. https://en.wikipedia.org/wiki/Comparison_of_linear_algebra_libraries
    - vi. 适合自己的才是最好的，
        - i. 做一个自己实用的线性代数库，尽可能能供多的人去继承，去开发。
        - ii. 要有自己的开发文档。
    - vii. eigen：https://github.com/Li-Simon/eigen-git-mirror
        - i. 功能比**Armadillo** 强大

第三节 需要做的事情

20180508

- [ ] 怎么把自己用gitbook创作的书同步到网上，这样就可以方便查看了，最好能设置只能个人看。
- [ ] C# Lamda表达式还是需要多看一些，自己写一些应用，用于Linq。
- [ ] Gitbook上怎么索引一个程序，这样就不要占用太多空间了。
- [ ] 自己写一个常见的优化算法的C++程序,涉及最常用的一些算法，主要是拟牛顿法这些，还有一些常见的机器学习算法，可以直接在工业中应用的高质量代码
    - [ ] 要保证库的基础性，不能依赖其它的库，但是也要保证库代码量尽量小

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- [ ] 任何时候，都需要对自己的决策(无论是投资还是工作选择)持怀疑态度，反身思考，以确证自己决策的合理性
- [ ] 怎么通过密码学保证你写的东西的时间是没有被篡改的？
- [ ] 把密码学笔记传到Gitbook上，通过图片的形式，有时间的话，要转成电子文字版而不是图像版
- [ ] 35988250+Li-Simon@users.noreply.github.com Li-Simon

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- [ ] Mathjax不能用
- [ ] 有空就思考用blockchain来做一些事情，知识的最终目的还是要转化成产品，变成有价值的东西。学习能力比知识储备更重要，只学不用会花费大量时间，因此更强调在应用的过程中学习。
- [x] 一个类里面实现多组接口
- [ ] 整理Bitcoin Code中一些基本类与函数，这个搭建整个BTC的基石，同步到Github上面去。

第四章 XXX

第一节 比特币代码分析

Validation.cpp
BTC 基本类

https://en.bitcoin.it/wiki/Dump_format

https://en.bitcoin.it/wiki/Bitcoin_Core_0.11_(ch_6):_The_Blockchain

https://bitcointalk.to/index.php?topic=1641447.0

```
class COutPoint
{
public:
    uint256 hash;  //
    uint32_t n;
}
COutPoint(000000, -1)
Part of a CTxIn structure, this references a specific output. The first value is the
truncated hash of the transaction, and the second value is an output index.
```

```
class CTxIn
{
public:
    COutPoint prevout;
    CScript scriptSig;
    uint32_t nSequence;
    CScriptWitness scriptWitness; //! Only serialized through CTransaction
}
CTxIn(COutPoint(237fe8, 0), scriptSig=0xA87C02384E1F184B79C6AC)
CTxIn(COutPoint(000000, -1), coinbase 04ffff001d010)
CTxIn(COutPoint(237fe8, 0), scriptSig=0xA87C02384E1F184B79C6AC, nSequence=5000)
A transaction input.
scriptSig is the truncated scriptSig of the input. "coinbase" is the non-truncated scriptSig of a generation
input.
nSequence appears only if the input has a non-default sequence.
Sequence numbers are intended for use with the transaction replacement feature, but can currently be safely i
gnored.
```

```
class CTxOut
{
public:
    CAmount nValue;
    CScript scriptPubKey;
}
CTxOut(nValue=50.00000000, scriptPubKey=OP_DUP OP_HASH160 0x1512)
A transaction output.
nValue is the the full-precision output value.
scriptPubKey is the truncated CScript for the output (the entire script string is truncated to 30 characters)
.
```

```
class CTransaction
{
public:
    const int32_t nVersion;
    const std::vector<CTxIn> vin;
    const std::vector<CTxOut> vout;
    const uint32_t nLockTime;
private:
    /** Memory only. */
    const uint256 hash;
}
CTransaction(hash=4a5e1e, ver=1, vin.size=1, vout.size=1, nLockTime=0)
CTxIn(COutPoint(000000, -1), coinbase 04ffff001d010)
CTxOut(nValue=50.00000000, scriptPubKey=0x5F1DF16B2B704C8A578D0B)
A transaction. hash is the truncated hash. ver is the transaction version.
vout.size is the number of outputs.
nLockTime is intended for use with transaction replacement, and is not currently used for anything useful.
```

```
class CBlockHeader
{
public:
    // header
    int32_t nVersion;
    uint256 hashPrevBlock;
    uint256 hashMerkleRoot;
    uint32_t nTime;
    uint32_t nBits;
    uint32_t nNonce;
}
class CBlock : public CBlockHeader
{
public:
    // network and disk
    std::vector<CTransactionRef> vtx;
}
CBlock(hash=00000000009ffdadbb2a, ver=1, hashPrevBlock=0000000000b079382c19, hashMerkleRoot=e81287,
nTime=1281156783, nBits=1c00ba18, nNonce=2283211008, vtx=6)
  CTransaction(hash=2d7f4d, ver=1, vin.size=1, vout.size=1, nLockTime=0)
    CTxIn(COutPoint(000000, -1), coinbase 0418ba001c02ce03)
    CTxOut(nValue=50.00000000, scriptPubKey=0x4FE11D72F988AEA611F026)
  CTransaction(hash=3407a8, ver=1, vin.size=2, vout.size=1, nLockTime=0)
    CTxIn(COutPoint(df39bf, 0), scriptSig=0x01DD1AD8E9EFE65B70E983)
    CTxIn(COutPoint(64ebea, 1), scriptSig=0x0165A1F9873BA16265D9C4)
    CTxOut(nValue=0.06000000, scriptPubKey=OP_DUP OP_HASH160 0xEDEF)
  CTransaction(hash=5edf5a, ver=1, vin.size=1, vout.size=1, nLockTime=0)
    CTxIn(COutPoint(b77e0f, 0), scriptSig=0x01E39C53AFC1B9BE02E53A)
    CTxOut(nValue=350.00000000, scriptPubKey=OP_DUP OP_HASH160 0xD7EF)
  CTransaction(hash=65c356, ver=1, vin.size=1, vout.size=2, nLockTime=0)
    CTxIn(COutPoint(893335, 0), scriptSig=0x01B8C315FD58F0DFA0DEA2)
    CTxOut(nValue=1.85850000, scriptPubKey=OP_DUP OP_HASH160 0x3181)
    CTxOut(nValue=3.14150000, scriptPubKey=OP_DUP OP_HASH160 0xF99E)
  CTransaction(hash=89aa32, ver=1, vin.size=1, vout.size=2, nLockTime=0)
    CTxIn(COutPoint(4a7469, 0), scriptSig=0x010D15199DCE4B11D391CF)
    CTxOut(nValue=0.05000000, scriptPubKey=OP_DUP OP_HASH160 0x5603)
    CTxOut(nValue=0.20000000, scriptPubKey=OP_DUP OP_HASH160 0x6074)
  CTransaction(hash=e3e69c, ver=1, vin.size=1, vout.size=2, nLockTime=0)
    CTxIn(COutPoint(b77e0f, 1), scriptSig=0x012E18AF1264180255E0C3)
    CTxOut(nValue=50.00000000, scriptPubKey=OP_DUP OP_HASH160 0x458E)
    CTxOut(nValue=100.00000000, scriptPubKey=OP_DUP OP_HASH160 0x9EEF)
  vMerkleTree: 2d7f4d 3407a8 5edf5a 65c356 89aa32 e3e69c 8ebc6a d5e414 89b77c d1074c 70a4e6 e81287

  A block. Hash is the truncated hash. Version is the block version.
  HashPrevBlock is the truncated hash of the previous block.
  HashMerkleRoot is the truncated Merkle root. nTime is the Unix timestamp of the block.
  nBits is the current target in compact format. nNonce is the nonce.
  vtx is the number of transactions.
```

```
class CChain {
private:
    std::vector<CBlockIndex*> vChain;
}
```

```
/** The block chain is a tree shaped structure starting with the
 * genesis block at the root, with each block potentially having multiple
 * candidates to be the next block. A blockindex may have multiple pprev pointing
 * to it, but at most one of them can be part of the currently active branch.
class CBlockIndex
{
public:
    //! pointer to the hash of the block, if any. Memory is owned by this CBlockIndex
    const uint256* phashBlock;

    //! pointer to the index of the predecessor of this block
    CBlockIndex* pprev;

    //! pointer to the index of some further predecessor of this block
    CBlockIndex* pskip;

    //! height of the entry in the chain. The genesis block has height 0
    int nHeight;

    //! Which # file this block is stored in (blk?????.dat)
    int nFile;

    //! Byte offset within blk?????.dat where this block's data is stored
    unsigned int nDataPos;

    //! Byte offset within rev?????.dat where this block's undo data is stored
    unsigned int nUndoPos;

    //! (memory only) Total amount of work (expected number of hashes) in the chain up to and including this
block
    arith_uint256 nChainWork;

    //! Number of transactions in this block.
    //! Note: in a potential headers-first mode, this number cannot be relied upon
    unsigned int nTx;

    //! (memory only) Number of transactions in the chain up to and including this block.
    //! This value will be non-zero only if and only if transactions for this block and all its parents are a
vailable.
    //! Change to 64-bit type when necessary; won't happen before 2030
    unsigned int nChainTx;

    //! Verification status of this block. See enum BlockStatus
    unsigned int nStatus;

    //! block header
    int nVersion;
    uint256 hashMerkleRoot;
    unsigned int nTime;
    unsigned int nBits;
    unsigned int nNonce;
    //! (memory only) Sequential id assigned to distinguish order in which blocks are received.
    int32_t nSequenceId;

    //! (memory only) Maximum nTime in the chain upto and including this block.
    unsigned int nTimeMax;
}
```

```
class CNodeStats
{
public:
    NodeId nodeid;
    ServiceFlags nServices;
    bool fRelayTxes;
    int64_t nLastSend;
    int64_t nLastRecv;
    int64_t nTimeConnected;
    int64_t nTimeOffset;
    std::string addrName;
    int nVersion;
    std::string cleanSubVer;
    bool fInbound;
    bool fAddnode;
    int nStartingHeight;
    uint64_t nSendBytes;
    mapMsgCmdSize mapSendBytesPerMsgCmd;
    uint64_t nRecvBytes;
    mapMsgCmdSize mapRecvBytesPerMsgCmd;
    bool fWhitelisted;
    double dPingTime;
    double dPingWait;
    double dMinPing;
    std::string addrLocal;
    CAddress addr;
};
```

```
/**
 * A CWallet is an extension of a keystore, which also maintains a set of transactions and balances,
 * and provides the ability to create new transactions.
 */
class CWallet : public CCryptoKeyStore, public CValidationInterface
{
private:
    static std::atomic<bool> fFlushThreadRunning;
    CWalletDB *m_pwalletdbEncryption;

    //! the current wallet version: clients below this version are not able to load the wallet
    int m_nWalletVersion;

    //! the maximum wallet format version: memory-only variable that specifies to what version this wallet ma
y be upgraded
    int m_nWalletMaxVersion;

    int64_t nNextResend;
    int64_t nLastResend;
    bool fBroadcastTransactions;
    TxSpends mapTxSpends;
    void AddToSpends(const COutPoint& outpoint, const uint256& wtxid);
    void AddToSpends(const uint256& wtxid);
    /* Mark a transaction (and its in-wallet descendants) as conflicting with a particular block. */
    void MarkConflicted(const uint256& hashBlock, const uint256& hashTx);

    void SyncMetaData(std::pair<TxSpends::iterator, TxSpends::iterator>);

    /* the HD chain data model (external chain counters) */
    CHDChain m_hdChain;

    bool m_fFileBacked;

    std::set<int64_t> setKeyPool;
    static CFeeRate minTxFee;
    static CFeeRate fallbackFee;

    void SetNull()
    {
        m_nWalletVersion = FEATURE_BASE;
        m_nWalletMaxVersion = FEATURE_BASE;
        m_fFileBacked = false;
        nMasterKeyMaxID = 0;
        m_pwalletdbEncryption = NULL;
        nOrderPosNext = 0;
        nNextResend = 0;
        nLastResend = 0;
        nTimeFirstKey = 0;
        fBroadcastTransactions = false;
    }
}
```

```
class CValidationInterface {
protected:
    virtual void UpdatedBlockTip(const CBlockIndex *pindexNew, const CBlockIndex *pindexFork, bool fInitialDo
wnload) {}
    virtual void SyncTransaction(const CTransaction &tx, const CBlockIndex *pindex, int posInBlock) {}
    virtual void SetBestChain(const CBlockLocator &locator) {}
    virtual void UpdatedTransaction(const uint256 &hash) {}
    virtual void Inventory(const uint256 &hash) {}
    virtual void ResendWalletTransactions(int64_t nBestBlockTime, CConnman* connman) {}
    virtual void BlockChecked(const CBlock&, const CValidationState&) {}
    virtual void GetScriptForMining(boost::shared_ptr<CReserveScript>&) {};
    virtual void ResetRequestCount(const uint256 &hash) {};
    virtual void NewPoWValidBlock(const CBlockIndex *pindex, const std::shared_ptr<const CBlock>& block) {};
    friend void ::RegisterValidationInterface(CValidationInterface*);
    friend void ::UnregisterValidationInterface(CValidationInterface*);
    friend void ::UnregisterAllValidationInterfaces();
};
```

```
/** Keystore which keeps the private keys encrypted.
 * It derives from the basic key store, which is used if no encryption is active.
 */
class CCryptoKeyStore : public CBasicKeyStore
{
private:
    CryptedKeyMap mapCryptedKeys;

    CKeyingMaterial vMasterKey;

    //! if fUseCrypto is true, mapKeys must be empty
    //! if fUseCrypto is false, vMasterKey must be empty
    bool fUseCrypto;

    //! keeps track of whether Unlock has run a thorough check before
    bool fDecryptionThoroughlyChecked;

protected:
    bool SetCrypted();

    //! will encrypt previously unencrypted keys
    bool EncryptKeys(CKeyingMaterial& vMasterKeyIn);

    bool Unlock(const CKeyingMaterial& vMasterKeyIn);
}
```

```
/** Basic key store, that keeps keys in an address->secret map */
class CBasicKeyStore : public CKeyStore
{
protected:
    KeyMap mapKeys;
    WatchKeyMap mapWatchKeys;
    ScriptMap mapScripts;
    WatchOnlySet setWatchOnly;
}
```

```
/** A virtual base class for key stores */
class CKeyStore
{
protected:
    mutable CCriticalSection cs_KeyStore;

public:
    virtual ~CKeyStore() {}

    //! Add a key to the store.
    virtual bool AddKeyPubKey(const CKey &key, const CPubKey &pubkey) =0;
    virtual bool AddKey(const CKey &key);

    //! Check whether a key corresponding to a given address is present in the store.
    virtual bool HaveKey(const CKeyID &address) const =0;
    virtual bool GetKey(const CKeyID &address, CKey& keyOut) const =0;
    virtual void GetKeys(std::set<CKeyID> &setAddress) const =0;
    virtual bool GetPubKey(const CKeyID &address, CPubKey& vchPubKeyOut) const =0;

    //! Support for BIP 0013 : see https://github.com/bitcoin/bips/blob/master/bip-0013.mediawiki
    virtual bool AddCScript(const CScript& redeemScript) =0;
    virtual bool HaveCScript(const CScriptID &hash) const =0;
    virtual bool GetCScript(const CScriptID &hash, CScript& redeemScriptOut) const =0;

    //! Support for Watch-only addresses
    virtual bool AddWatchOnly(const CScript &dest) =0;
    virtual bool RemoveWatchOnly(const CScript &dest) =0;
    virtual bool HaveWatchOnly(const CScript &dest) const =0;
    virtual bool HaveWatchOnly() const =0;
};
```

第二节 Bitcoin-cli API

```
A、一般性的命令
help ( "command" )
stop
getinfo
ping
getnettotals
getnetworkinfo
getpeerinfo
getconnectioncount
verifychain ( checklevel numblocks )
getaddednodeinfo dns ( "node" )
addnode "node" "add|remove|onetry"



B、钱包、账户、地址、转帐、发消息
getwalletinfo
walletpassphrase "passphrase" timeout
walletlock
walletpassphrasechange "oldpassphrase" "newpassphrase"
backupwallet "destination"
importwallet "filename"
dumpwallet "filename"

listaccounts ( minconf )
getaddressesbyaccount "account"
getaccountaddress "account"
getaccount "bitcoinaddress"
validateaddress "bitcoinaddress"
dumpprivkey "bitcoinaddress"
setaccount "bitcoinaddress" "account"
getnewaddress ( "account" )
keypoolrefill ( newsize )
importprivkey "bitcoinprivkey" ( "label" rescan )
createmultisig nrequired ["key",...]
addmultisigaddress nrequired ["key",...] ( "account" )

getbalance ( "account" minconf )
getunconfirmedbalance
getreceivedbyaccount "account" ( minconf )
listreceivedbyaccount ( minconf includeempty )
getreceivedbyaddress "bitcoinaddress" ( minconf )
listreceivedbyaddress ( minconf includeempty )
move "fromaccount" "toaccount" amount ( minconf "comment" )
listunspent ( minconf maxconf  ["address",...] )
listlockunspent
lockunspent unlock [{"txid":"txid","vout":n},...]


getrawchangeaddress
listaddressgroupings
settxfee amount
sendtoaddress "bitcoinaddress" amount ( "comment" "comment-to" )
sendfrom "fromaccount" "tobitcoinaddress" amount ( minconf "comment" "comment-to" )
sendmany "fromaccount" {"address":amount,...} ( minconf "comment" )
```

```
signmessage "bitcoinaddress" "message"
verifymessage "bitcoinaddress" "signature" "message"


C、Tx、Block、Ming

createrawtransaction [{"txid":"id","vout":n},...] {"address":amount,...}
signrawtransaction "hexstring" ( [{"txid":"id","vout":n,"scriptPubKey":"hex","redeemScript":"hex"},...] ["privatekey1",...] sighashtype )
sendrawtransaction "hexstring" ( allowhighfees )


gettransaction "txid"
listtransactions ( "account" count from )
listsinceblock ( "blockhash" target-confirmations )


getrawmempool ( verbose )
gettxoutsetinfo
gettxout "txid" n ( includemempool )
getrawtransaction "txid" ( verbose )
decoderawtransaction "hexstring"
decodescript "hex"

getblockchaininfo
getblockcount
getbestblockhash
getblockhash index
getblock "hash" ( verbose )

getmininginfo
getdifficulty
getnetworkhashps ( blocks height )
gethashespersec

getgenerate
setgenerate generate ( genproclimit )
getwork ( "data" )
getblocktemplate ( "jsonrequestobject" )
submitblock "hexdata" ( "jsonparametersobject" )
```

第三节 比特币下的区块链

第五章:算法

第一节 Kriging插值

https://xg1990.com/blog/archives/222
空间插值问题，就是在已知空间上若干离散点 $$(x_i,y_i)$$的某一属性(如气温，海拔)的观测值$$z_i = z(x_i,y_i)$$的条件下，估计空间上任意一点$$(x,y)$$的属性值的问题。
直观来讲，根据地理学第一定律，

All attribute values on a geographic surface are related to each other, but closer values are more strongly related than are more distant ones.
大意就是，地理属性有空间相关性，相近的事物会更相似。由此人们发明了反距离插值，对于空间上任意一点$$(x,y)$$ 的属性$$z = z (x , y)$$,
定义反距离插值公式估计量 $$\hat{z} = \sum^{n}_{i=0}{\frac{1}{d^\alpha}z_i}$$
其中$$α$$通常取1或者2。

即，用空间上所有已知点的数据加权求和来估计未知点的值，权重取决于距离的倒数（或者倒数的平方）。

那么，距离近的点，权重就大；距离远的点，权重就小。反距离插值可以有效的基于地理学第一定律估计属性值空间分布，但仍然存在很多问题：

$$α$$的值不确定 用倒数函数来描述空间关联程度不够准确

因此更加准确的克里金插值方法被提出来了

克里金插值公式$$\hat{zo} = \sum^{n}{i=0}{\lambda_iz_i}$$
其中$$\hat{z_0}$$是点$$(x_o,y_o)$$处的估计值，即：$$z_o=z(x_o,y_o)$$
假设条件:

1. 无偏约束条件 $$E(\hat{z_0} - z_0) = 0$$
2. 优化目标/代价函数 $$J = Var((\hat{z_0} - z_0))$$取极小值
3. 半方差函数$$r{ij}$$与空间距离$$d{ij}$$存在关联,并且这个关联可以通过这这两组数拟合出来，因此可以用距离$$d{ij}$$来求得$$r{ij}$$

半方差函数$$r{ij} = \sigma^2 - C{ij}$$; 等价于$$r{ij} = \frac{1}{2}E[(z_i-z_j)^2]$$
求得$$r{ij}$$之后，我们就可以求得$$\lambda_i$$

$$\begin{bmatrix}r{11}&r{12}&\cdots&r{1n}&1\ r{21}&r{22}&\cdots&r{2n}&1\\cdots&\cdots&\cdots&\cdots&\cdots\r{n1}&r{n2}&\cdots&r{nn}&1\1&1&\cdots&1&0\end{bmatrix}\begin{bmatrix} \lambda_1\ \lambda_2\\cdots\\lambda_n\0\end{bmatrix}=\begin{bmatrix} r{1o}\ r{2o}\\cdots\r{no}\1\end{bmatrix}$$

结束