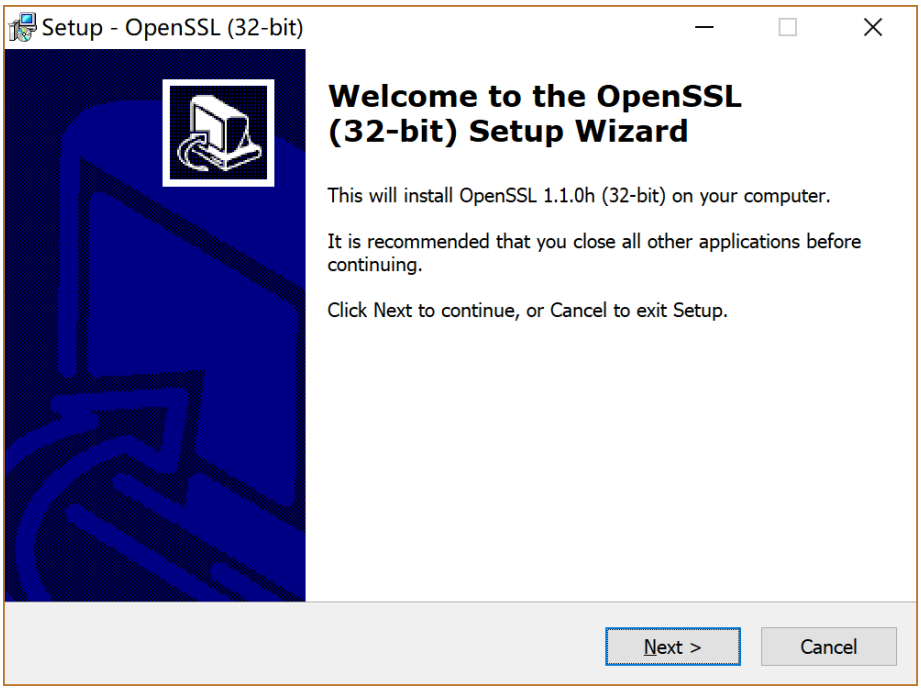
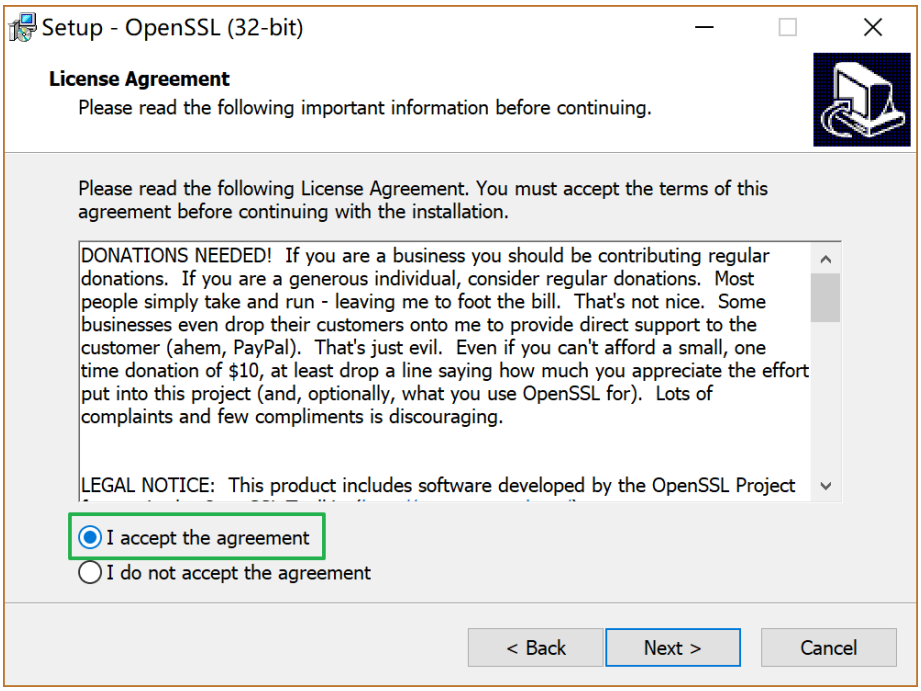
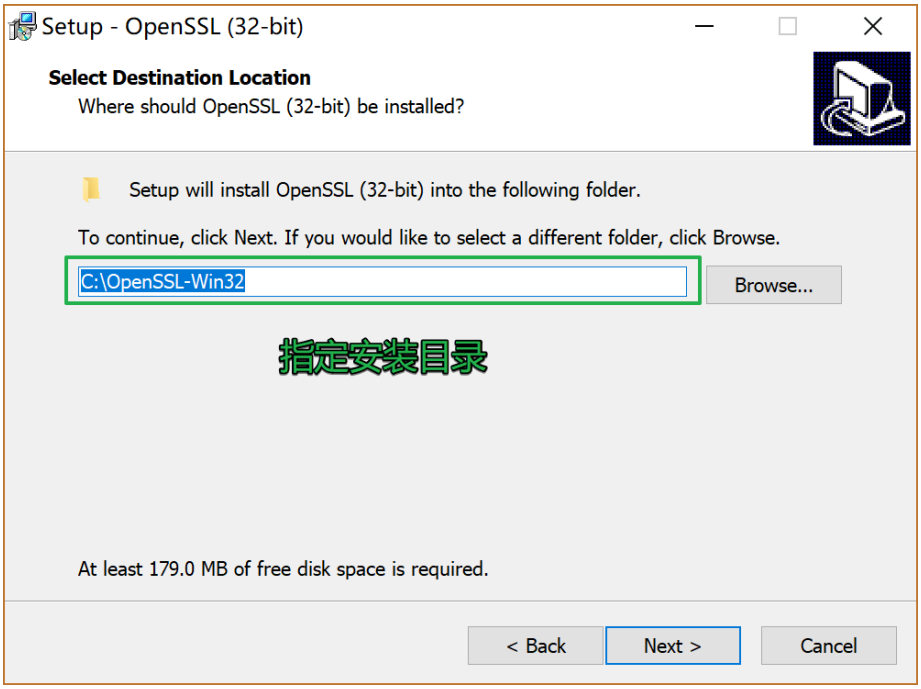
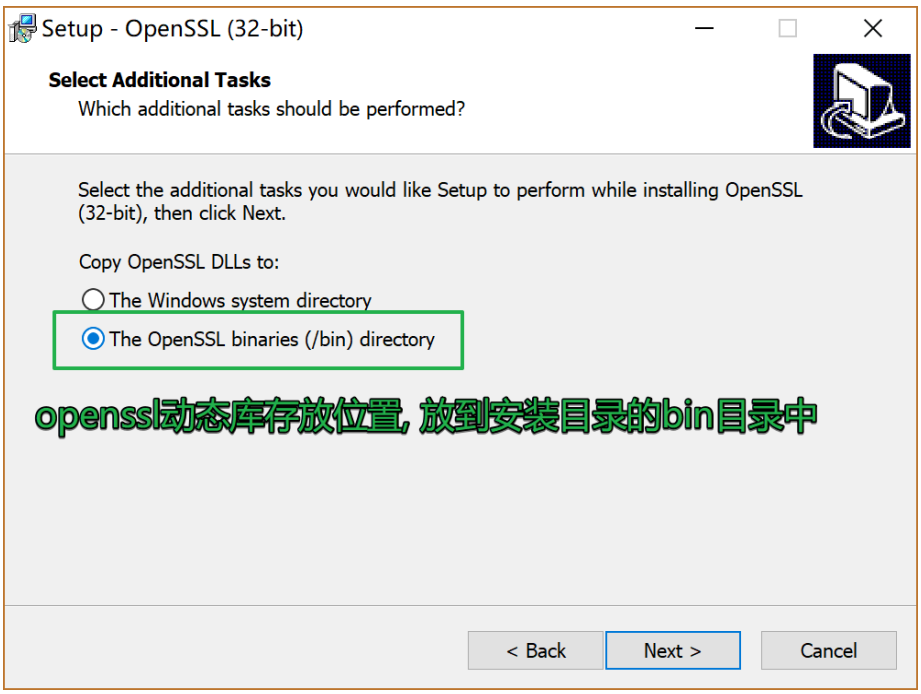
1. 安装

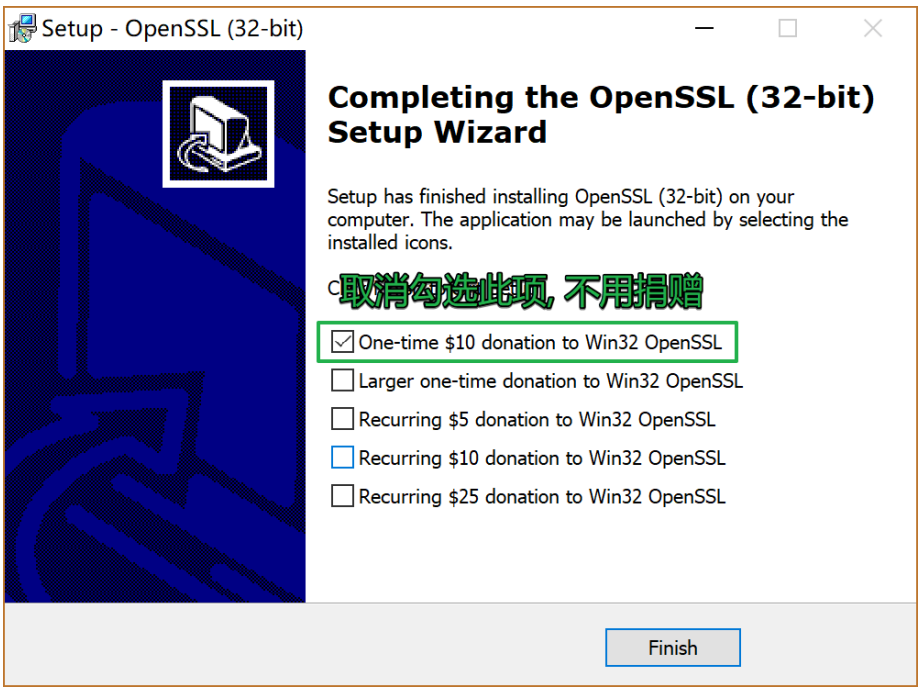
1.1 windows下安装openssl






Setup - OpenSSL (32-bit)
Select Destination Location
Where should OpenSSL (32-bit) be installed?
Setup will install OpenSSL (32-bit) into the following folder.
To continue, click Next. If you would like to select a different folder, click Browse.
C:\OpenSSL-Win32
Browse...
指定安装目录
At least 179.0 MB of free disk space is required.
< Back
Next >
Cancel


Setup - OpenSSL (32-bit)
Select Additional Tasks
Which additional tasks should be performed?
Select the additional tasks you would like Setup to perform while installing OpenSSL (32-bit), then click Next.
Copy OpenSSL DLLs to:
The Windows system directory
The OpenSSL binaries (/bin) directory
openssl动态库存放位置，放到安装目录的bin目录中
< Back
Next >
Cancel



恭喜，OpenSSL安装完成。

1.2 Linux下安装OpenSSL

1. 下载安装包, 下载地址: https://github.com/openssl/openssl
2. 源码安装包解压缩
   - .zip格式:

     ```
     unzip openssl.zip
     ```

   - .tar.gz格式:

     ```
     tar zxvf openssl.tar.gz
     ```

   - .tar.bz格式:

     ```
     tar jxvf openssl.tar.gz
     ```

3. 进入解压目录, 安装（可参考安装文件INSTALL）：

   ```
   ./config
   make
   make test        (可选)
   make install     (使用管理员权限执行该命令)
   ```

4. 验证是否安装成功

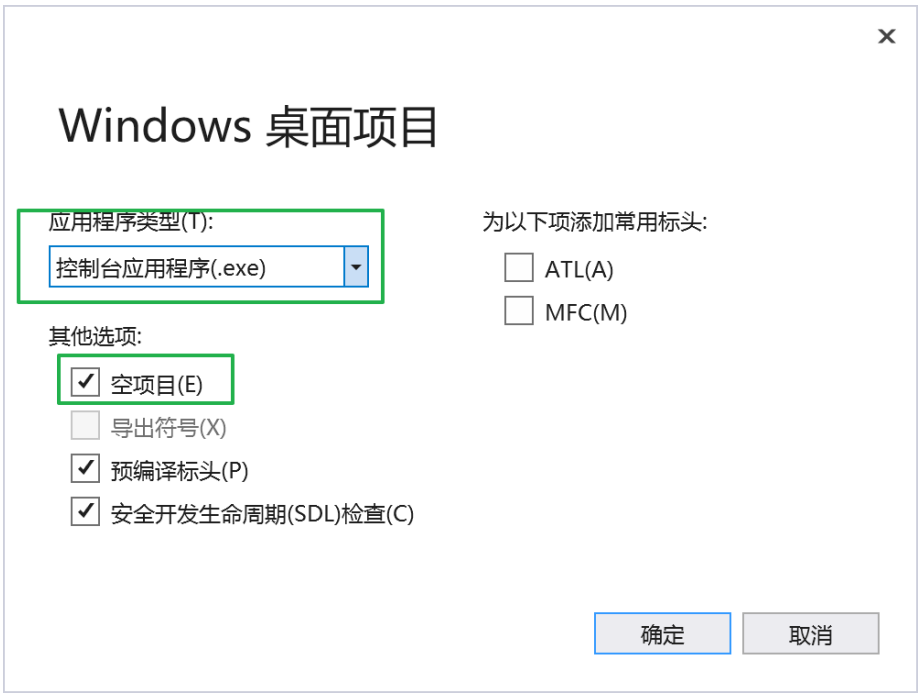
```
openssl version -a
```

输出结果

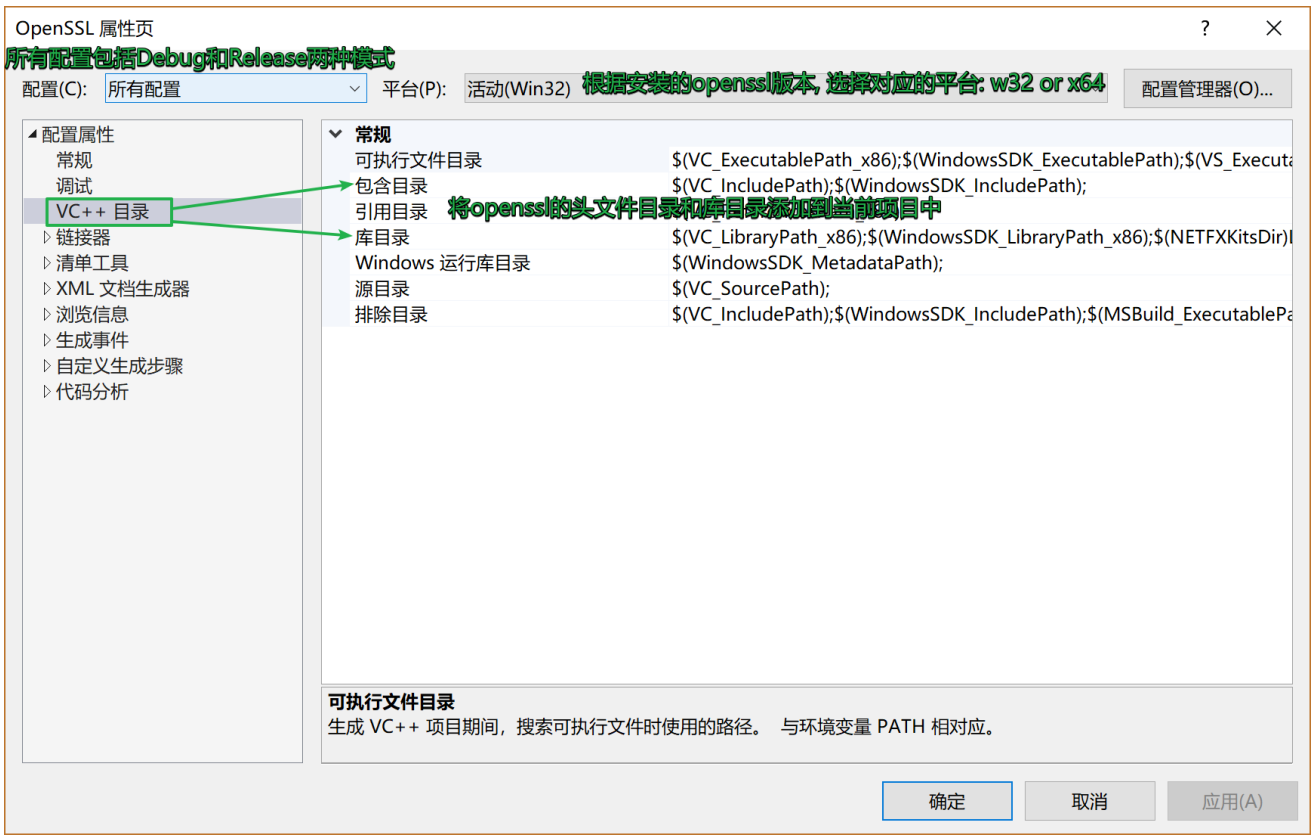
```
OpenSSL 1.1.1-pre6-dev  xx XXX xxxx
built on: Mon Apr 23 10:53:02 2018 UTC
platform: linux-x86_64
options:  bn(64,64) rc4(16x,int) des(int) idea(int) blowfish(ptr)
compiler: gcc -fPIC -pthread -m64  -Wa,--noexecstack -Wall -O3 -DOPENSSL_USE_NODELETE -DL_ENDIAN -DOPENSSL_PIC -DOPENSSL_CPUID_OBJ -DOPENSSL_IA32_SSE2 -DOPENSSL_BN_ASM_MONT -DOPENSSL_BN_ASM_MONT5 -DOPENSSL_BN_ASM_GF2m -DSHA1_ASM -DSHA256_ASM -DSHA512_ASM -DRC4_ASM -DMD5_ASM -DAES_ASM -DVPAES_ASM -DBSAES_ASM -DGHASH_ASM -DECP_NISTZ256_ASM -DX25519_ASM -DPADLOCK_ASM -DPOLY1305_ASM -DNDEBUG
OPENSSLDIR: "/usr/local/ssl"
ENGINESDIR: "/usr/local/lib64/engines-1.1"
Seeding source: os-specific
```

2 VS中使用openssl

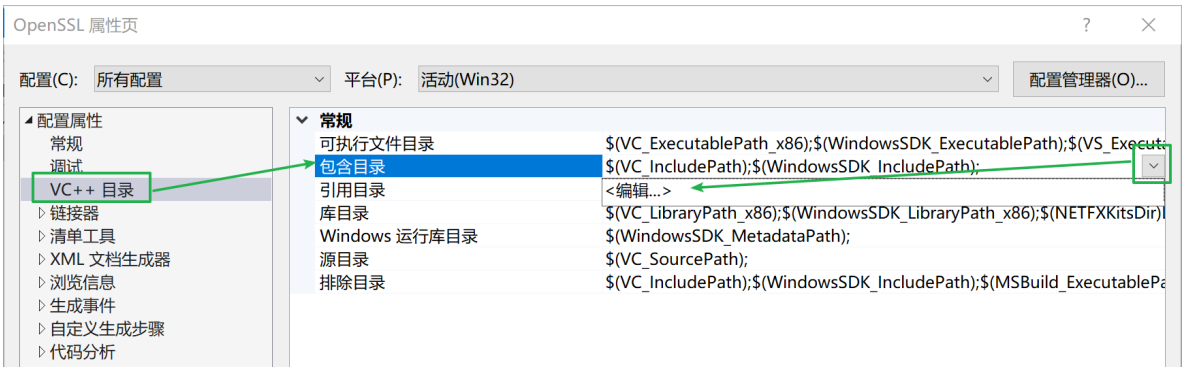
打开VS, 创建一个空的控制台应用程序

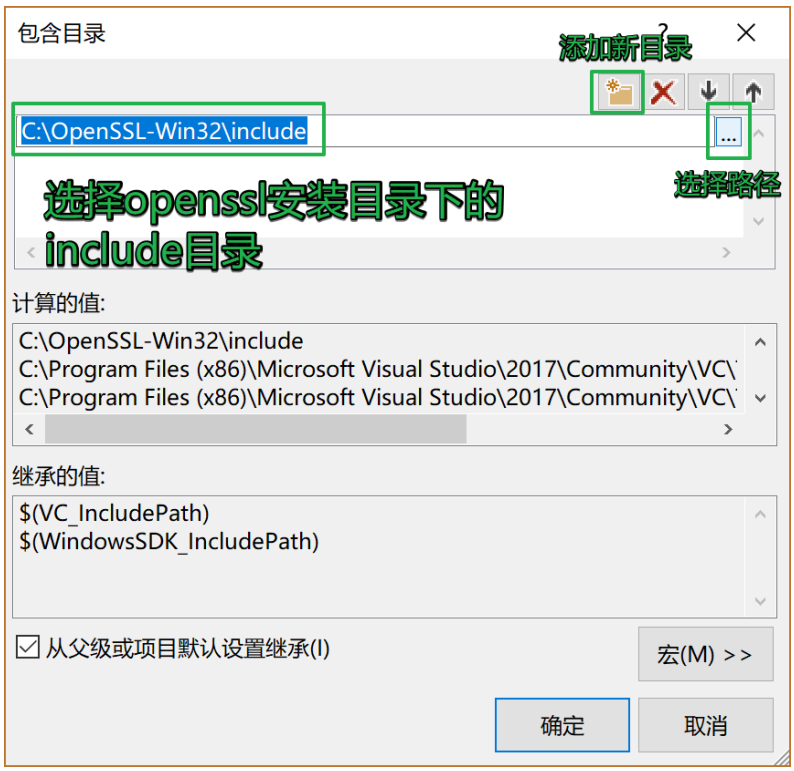


设置项目属性, 打开项目的属性面板

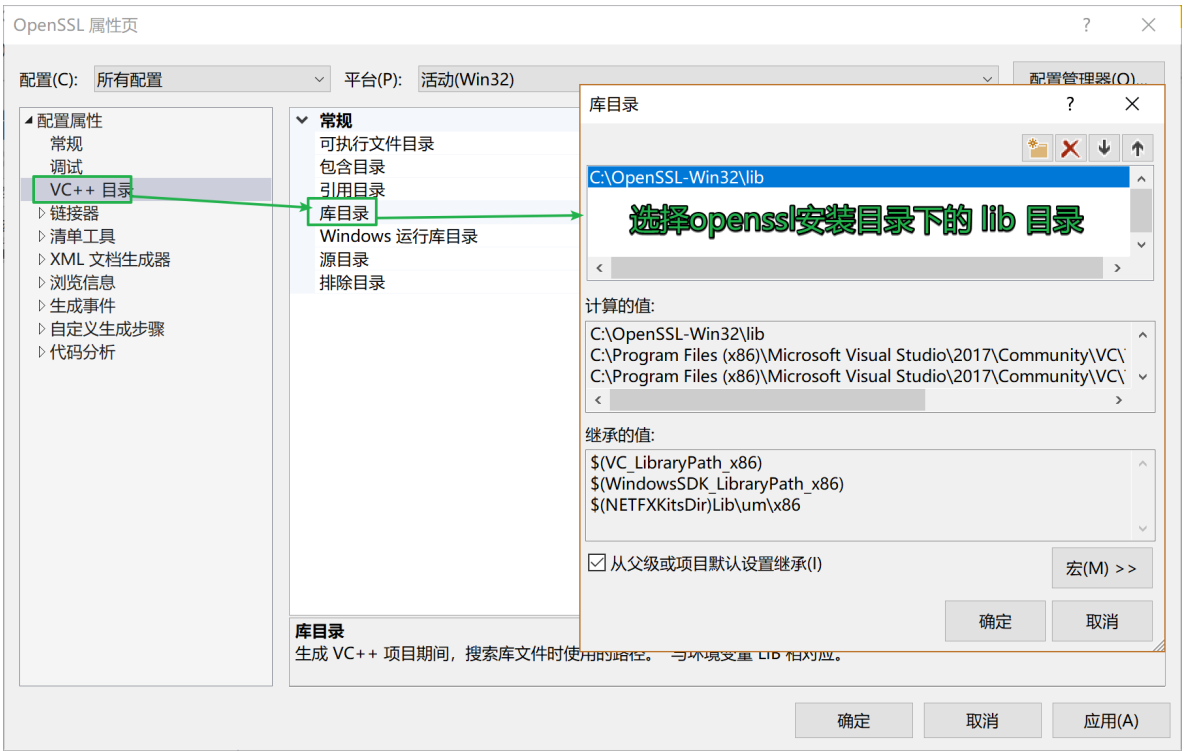


添加openssl头文件目录

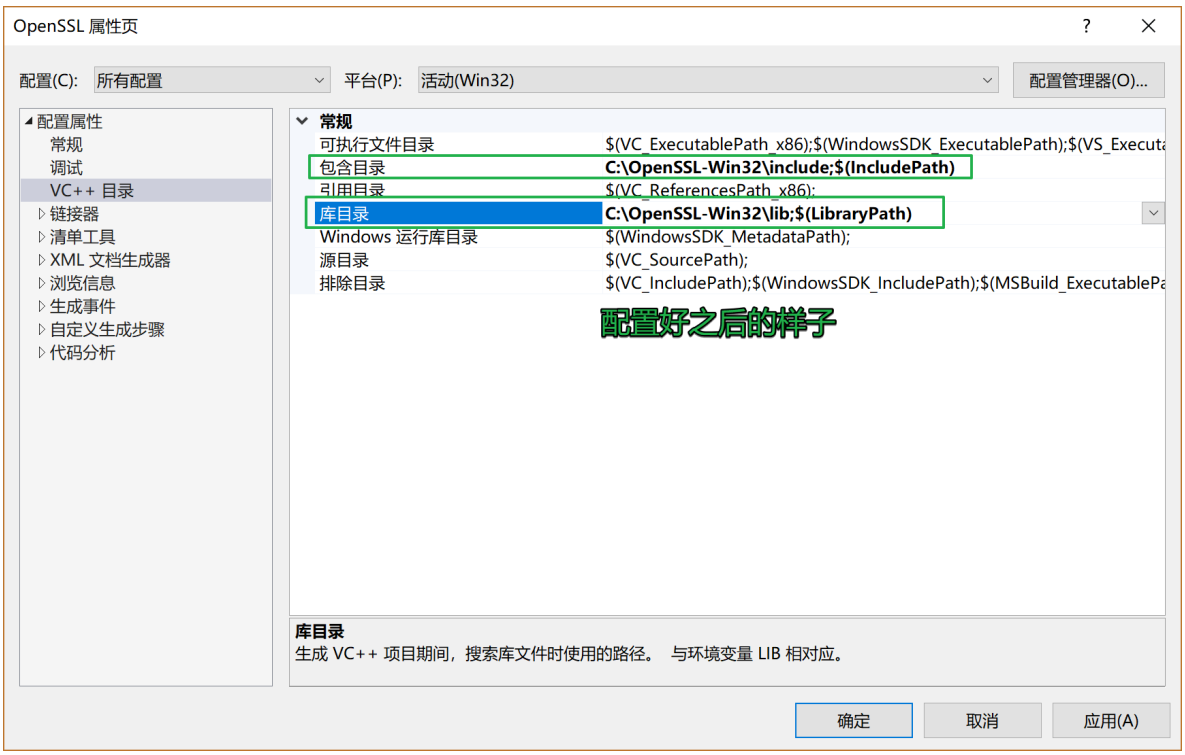




添加openssl的库目录



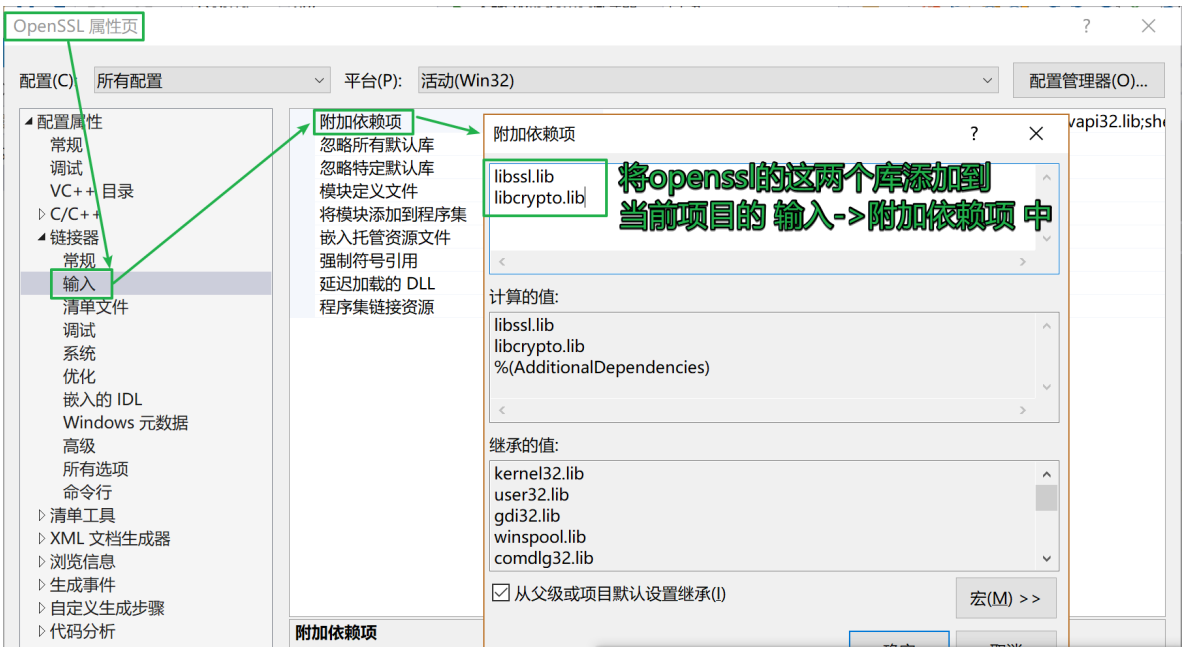
配置完毕

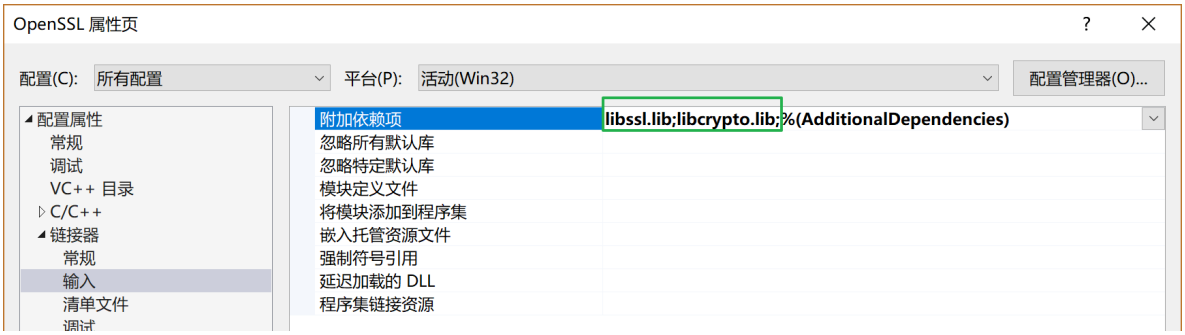


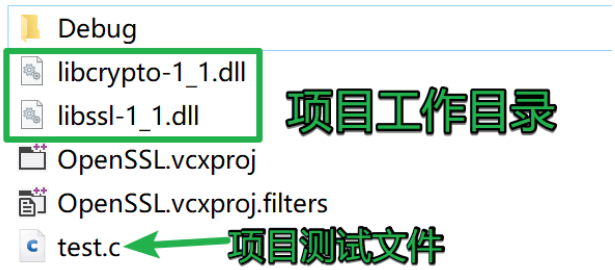
3. 测试

3.1 VS中的相关设置

> 打开项目属性窗口, 添加openssl相关的库到项目中
>
> **项目属性 -> 链接器 -> 输入 -> 附件依赖项**
>
> - **libssl.lib**
> - **libcrypto.lib**





> 将openssl安装目录/bin目录下(**C:\OpenSSL-Win32\bin**)的两个动态库拷贝到工作目录下:
>
> - **libcrypto-1_1.dll**
> - **libssl-1_1.dll**
>
> **C:\OpenSSL-Win32 是我的openssl安装目录**
>
> 如图所示:
>
> 
>

测试代码如下:

```
#define _CRT_SECURE_NO_WARNINGS
#include <openssl/md5.h>        // md5 头文件
#include <stdio.h>
#include <string.h>
#include <stdlib.h>

void getMD5(const char* str, char* result)
{
    MD5_CTX ctx;
    // 初始化
    MD5_Init(&ctx);
    // 添加数据
    MD5_Update(&ctx, str, strlen(str));
    // 计算结果
    unsigned char md[16] = { 0 };
    MD5_Final(md, &ctx);
    for (int i = 0; i < 16; ++i)
    {
        sprintf(&result[i * 2], "%02x", md[i]);
    }
}


int main()
```

```
{
    char result[33] = { 0 };
    getMD5("hello, md5", result);
    printf("md5 value: %s\n", result);
    system("pause");

    return 0;
}
```

```
输出结果：
    md5 value: 33b3bc8e05b4fcc16bd531dd9adac166
```

3.2 Linux下的使用和测试

1. 编程应用程序, 测试代码如上, 文件名为 `md5_test.c`
2. 通过gcc编译源文件

```
gcc md5_test.c -o md5 -lssl -lcrypto
执行该命令，需要加载openssl的两个动态库
    - libssl.so
    - libcrypto.so
```

3. 查看生成的可执行程序 md5 运行时需要加载的动态库

```
ldd md5
```

输出结果:

```
linux-vdso.so.1 =>  (0x00007ffdac781000)
libssl.so.1.1 => not found
libcrypto.so.1.1 => not found
libc.so.6 => /lib64/libc.so.6 (0x00007f365c3aa000)
/lib64/ld-linux-x86-64.so.2 (0x00007f365c782000)
```

提示动态库 libssl.so.1.1 和 libcrypto.so.1.1 链接不到

4. 通过find查找两个动态库的位置

```
find / -name "libssl.so.1.1"
输出结果：
/root/openssl-master/libssl.so.1.1
/usr/local/lib64/libssl.so.1.1

find / -name "libcrypto.so.1.1"
输出结果：
/root/openssl-master/libcrypto.so.1.1
/usr/local/lib64/libcrypto.so.1.1
```

通过对输出结果的分析，得出结论动态库所在的目录为: /usr/local/lib64

5. 解决问题，将找到的**动态库绝对路径**添加到 **/etc/ld.so.conf** 文件中，并**使用管理员权限执行命令ldconfig**

```
sudo vim /etc/ld.so.conf
将/usr/local/lib64 添加到文件末尾，保存退出配置文件
更新配置：
sudo ldconfig
```

6. 验证

```
ldd md5
        linux-vdso.so.1 =>  (0x00007ffcd8fe0000)
        libssl.so.1.1 => /usr/local/lib64/libssl.so.1.1 (0x00007fb7aae7d000)
        libcrypto.so.1.1 => /usr/local/lib64/libcrypto.so.1.1 (0x00007fb7aa9a2000)
        libc.so.6 => /lib64/libc.so.6 (0x00007fb7aa5e1000)
        libdl.so.2 => /lib64/libdl.so.2 (0x00007fb7aa3dd000)
        libpthread.so.0 => /lib64/libpthread.so.0 (0x00007fb7aa1c0000)
        /lib64/ld-linux-x86-64.so.2 (0x00007fb7ab123000)
```