

## 前置要求:

操作系统: Ubuntu 22.04

CPU架构: x86\_64

参考Electron鸿蒙化指导文档git拉取Electron源代码

## 一、aki源码下载和编译

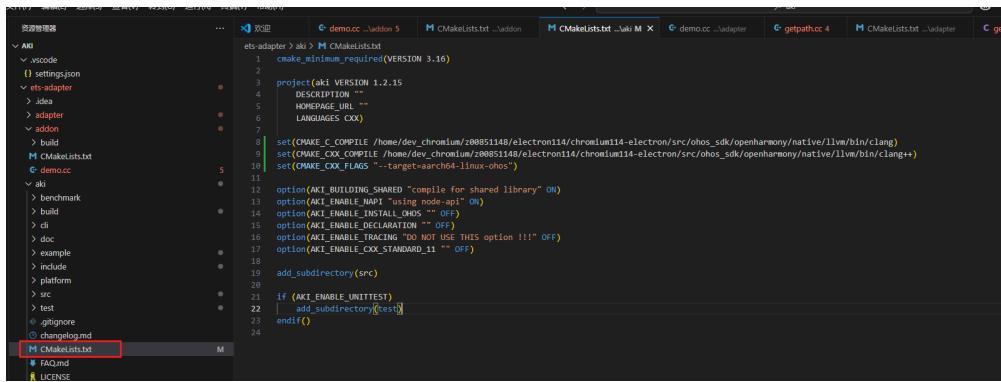
### 1 利用git下拉aki框架代码

```
git clone https://gitee.com/openharmony-sig/aki.git
```

### 2 配置cmake

进入aki目录，在cmake中增加以下编译配置（服务器中鸿蒙clang、clang++对应的路径，以下路径仅作参考）：

```
set(CMAKE_C_COMPILE /home/dev_chromium/z00851148/electron114/chromium114-electron/src/ohos_sdk/openharmony/native/llvm/bin/clang)
set(CMAKE_CXX_COMPILE /home/dev_chromium/z00851148/electron114/chromium114-electron/src/ohos_sdk/openharmony/native/llvm/bin/clang++)
set(CMAKE_CXX_FLAGS "--target=aarch64-linux-ohos")
```



```
cmake_minimum_required(VERSION 3.16)
project(aki VERSION 1.2.35
        DESCRIPTION --
        HOMEPAGE_URL --
        LANGUAGES CXX)
set(CMAKE_C_COMPILE /home/dev_chromium/z00851148/electron114/chromium114-electron/src/ohos_sdk/openharmony/native/llvm/bin/clang)
set(CMAKE_CXX_COMPILE /home/dev_chromium/z00851148/electron114/chromium114-electron/src/ohos_sdk/openharmony/native/llvm/bin/clang++)
set(CMAKE_CXX_FLAGS "--target=aarch64-linux-ohos")
option(AKI_BUILDING_SHARED "Compile for shared library" ON)
option(AKI_ENABLE_MAP "using node-api" ON)
option(AKI_ENABLE_INSTALL_OHOS "" OFF)
option(AKI_ENABLE_DECLARATION "" OFF)
option(AKI_ENABLE_TRACING "DO NOT USE THIS option !!!" OFF)
option(AKI_ENABLE_CXX_STANDARD_11 "" OFF)
add_subdirectory(src)
if (AKI_ENABLE_UNITTEST)
    add_subdirectory(test)
endif()
```

### 3 配置环境变量（clang、clang++换为实际路径）

```
export CC=/home/dev_chromium/z00851148/electron114/chromium114-electron/src/ohos_sdk/openharmony/native/llvm/bin/clang --target=a
export CXX=/home/dev_chromium/z00851148/electron114/chromium114-electron/src/ohos_sdk/openharmony/native/llvm/bin/clang++ --targe
```

### 4 编译

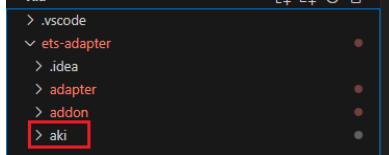
运行结束在build/src路径会生成最终的编译产物 libaki\_jsbind.so

```
cd aki
mkdir build
cd build
cmake .. -DCMAKE_BUILD_TYPE=Release
make
```

## 二、应用adapter编写

### 1 样例目录结构

目录结构图示如下：



其中，aki文件夹为第一步git下来的aki。

### 2. 仿照adapter下的demo进行方法的注册

```

1 // 欢迎 x e demo.cc \addon M CMakeLists.txt M e demo.cc \adapter x e getpath.cc
2 ets-adapter > adapter > e demo.cc > getNativeContext(napi_env, napi_callback_info)
3 #include "third_party/electron_node/src/node.h"
4 #include "openharmony/native/sysroot/usr/include/napi/native_api.h"
5 #include "openharmony/native/sysroot/usr/include/napi/native_apitypes.h"
6 #include "aki/jbind.h"
7 #include <string>
8 #include <csdio.h>
9 #define DECLARE_NAPI_METHOD(name, func) { name, 0, func, 0, 0, 0, napi_default, 0 }
10 using v8::FunctionCallbackInfo;
11 using v8::Isolate;
12 using v8::Local;
13 using v8::MessageArgType;
14 using v8::Object;
15 using v8::String;
16 using v8::Value;
17
18 static napi_value getNativeContext(napi_env env, napi_callback_info info) {
19     napi_value exports;
20     if (napi_create_object(env, &exports) != napi_ok) {
21         napi_throw_type_error(env, nullptr, "napi_create_object failed");
22         return exports;
23     }
24     aki::JSBind::BindSymbols(env, exports);
25     return exports;
26 }
27
28
29
30 static napi_value Initialize(napi_env env, napi_value exports) {
31     if (env == nullptr || exports == nullptr) {
32         return exports;
33     }
34     napi_property_descriptor desc[] = {
35         DECLARE_NAPI_METHOD("getNativeContext", getNativeContext)
36     };
37     if (napi_define_properties(env, exports, sizeof(desc) / sizeof(desc[0]),
38         desc) != napi_ok) {
39         return exports;
40     }
41     return exports;
42 }
43
44
45 static napi_module adaptortestModule = {
46     .nm_version = 1,
47     .nm_flags = 0,
48     .nm_filename = nullptr,
49     .nm_register_func = Initialize,
50     .nm_modname = "adaptortest",
51     .nm_rev = ((void*)nullptr),
52     .reserved = (void*)nullptr,
53 };
54
55 extern "C" __attribute__((constructor)) void RegisterAdaptortestModule(void) {
56     napi_module_register(&adaptortestModule);
57 }

```

### 3. 仿照getPatch.cc进行方法的绑定

此处提供同步和异步两种方式，供应用自己选择：

```

1 // 欢迎 x e demo.cc \addon M CMakeLists.txt M e demo.cc \adapter x e getpath.cc 4 e getpath.h 2
2 ets-adapter > adapter > e getpath.cc > (PathAdapter > @GetDir(std::string&)
3 #include "functional"
4 #include "aki/jbind.h"
5 namespace PathAdapter {
6     static std::string GetDir(std::string& getDirFuncName) {
7         // 同步方式
8         if (auto getDirFunc = aki::JSBind::GetJSFunction(getDirFuncName)) {
9             auto path = getDirFunc->Invoke<std::string>();
10            return path;
11        }
12        return "";
13    }
14
15    // 异步方式
16    // std::promise<std::string> promise;
17    // std::function<void(std::string)> callback = [&promise](std::string path) {
18    //     promise.set_value(path);
19    // };
20
21    // If (auto jsFunc = aki::JSBind::GetJSFunction(getDirFuncName)) {
22    //     jsFunc->Invoke<void>(callback);
23    // } else {
24    //     return "";
25    // }
26
27    // auto future = promise.get_future();
28    // auto status = future.wait_for(std::chrono::seconds(5));
29    // if (status == std::future_status::timeout) {
30    //     return "timeout";
31    // }
32    // return future.get();
33 }
34
35

```

### 4. CMakeLists编写

```

# Project Name
SET(TARGETFILENAME "adaptortest")
PROJECT(${TARGETFILENAME})

# CMake minimum version requirement setting
cmake_minimum_required(VERSION 3.8)

# set electron path
set(ELE_PATH /home/dev_chromium/z00851148/electron114/chromium114-electron)

# ohos
set(CMAKE_C_COMPILER ${ELE_PATH}/src/ohos_sdk/openharmony/native/llvm/bin/clang)
set(CMAKE_CXX_COMPILER ${ELE_PATH}/src/ohos_sdk/openharmony/native/llvm/bin/clang++)
set(CMAKE_CXX_FLAGS "--target=aarch64-linux-ohos")

# 设置包含目录
# ohos
include_directories(${ELE_PATH}/src/)
include_directories(${ELE_PATH}/src/third_party/electron_node/deps/v8/include/)
include_directories(${ELE_PATH}/src/ohos_sdk/)
include_directories(${CMAKE_CURRENT_SOURCE_DIR}/../aki/include)

message(${CMAKE_CURRENT_SOURCE_DIR})

set(src demo.cc getpath.cc)
set(headers getpath.h)

# 生成可执行文件
#add_executable(${TARGETFILENAME} demo.cpp)

# 生成静态库
#ADD_LIBRARY(${TARGETFILENAME} STATIC demo.cpp)

# 生成动态库或共享库

```

```

ADD_LIBRARY(${TARGETFILENAME} SHARED
    ${src}
)
target_compile_features(${TARGETFILENAME} PUBLIC cxx_std_17)
target_compile_definitions(${TARGETFILENAME} PUBLIC JSBIND_USING_NAPI=1)
target_compile_definitions(${TARGETFILENAME} PUBLIC AKI_BUILDING_SHARED=1)

# 设置链接库文件-ohos
target_link_libraries(${TARGETFILENAME} PUBLIC ${CMAKE_CURRENT_SOURCE_DIR}/../aki/build/src/libaki_jsbind.so)
target_link_libraries(${TARGETFILENAME} PUBLIC ${ELE_PATH}/src/out/musl_64/libelectron.so)

# 修改后缀名为 .node
# SET_TARGET_PROPERTIES(${TARGETFILENAME} PROPERTIES SUFFIX ".node")

```

## 5. 获取编译产物

执行命令，可获取编译产物libadaptertest.so

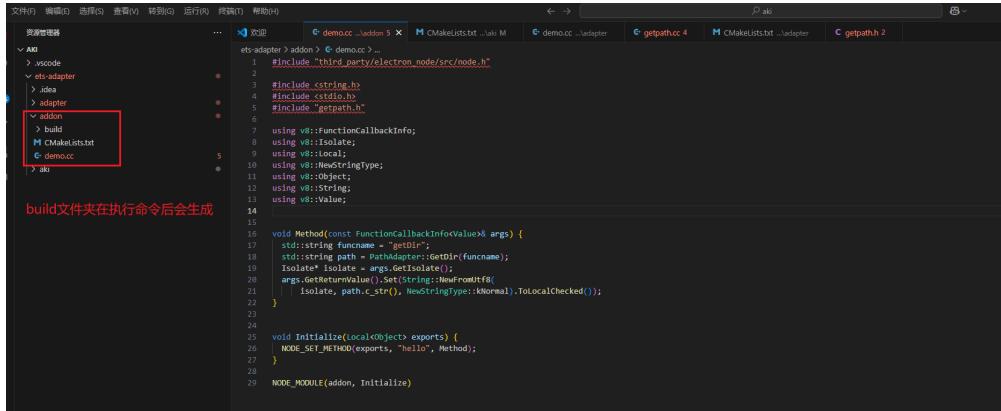
```

mkdir build
cd build
cmake ..
make

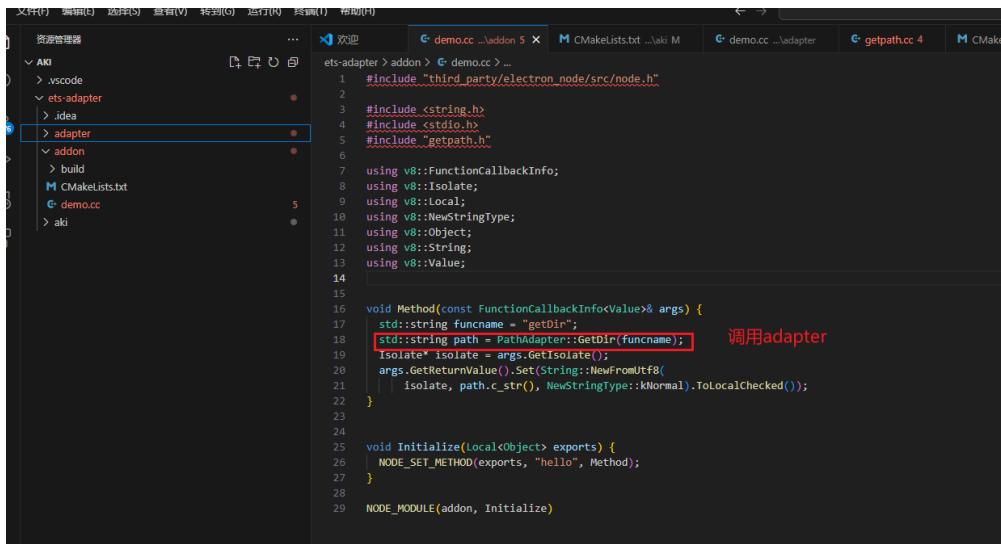
```

## 三、应用addon编写

### 1 样例目录结构



### 2 调用adapter



### 3 CMakeLists编写

```

# Project Name
SET(TARGETFILENAME "addon")
PROJECT(${TARGETFILENAME})

# CMake minimum version requirement setting
cmake_minimum_required(VERSION 3.8)

# set electron path
set(ELE_PATH /home/dev_chromium/z00851148/electron114/chromium114-electron)

# ohos
set(CMAKE_C_COMPILER ${ELE_PATH}/src/ohos_sdk/openharmony/native/llvm/bin/clang)
set(CMAKE_CXX_COMPILER ${ELE_PATH}/src/ohos_sdk/openharmony/native/llvm/bin/clang++)
set(CMAKE_CXX_FLAGS "--target=aarch64-linux-ohos")

# 设置包含目录
# ohos

include_directories(${ELE_PATH}/src/)
include_directories(${ELE_PATH}/src/third_party/electron_node/deps/v8/include/)

```

```

include_directories(${ELE_PATH}/src/ohos_sdk/)
include_directories(${CMAKE_CURRENT_SOURCE_DIR}/../adapter/)

message(${CMAKE_CURRENT_SOURCE_DIR})
set(src demo.cc)
# 生成可执行文件
#add_executable(${TARGETFILENAME} demo.cpp)

# 生成静态库
#ADD_LIBRARY(${TARGETFILENAME} STATIC demo.cpp)

# 生成动态库或共享库
ADD_LIBRARY (${TARGETFILENAME} SHARED
${src}
)

# 设置链接库文件-ohos
target_link_libraries(${TARGETFILENAME} PUBLIC ${ELE_PATH}/src/out/musl_64/libelectron.so)
target_link_libraries(${TARGETFILENAME} PUBLIC ${CMAKE_CURRENT_SOURCE_DIR}/../adapter/build/libadaptertest.so)
target_compile_definitions(${TARGETFILENAME} PUBLIC NODE_MODULE_VERSION=116)

# 修改后缀名为 .node
SET_TARGET_PROPERTIES(${TARGETFILENAME} PROPERTIES SUFFIX ".node")

```

## 4 获取编译产物

执行下述命令后，可获取编译产物addon.node

```

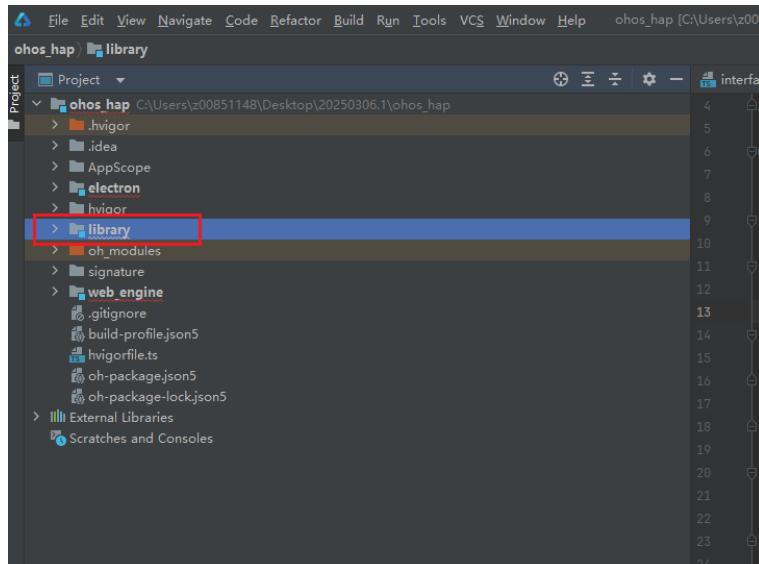
mkdir build
cd build
cmake ../
make

```

# 四、ets调用及har包构建

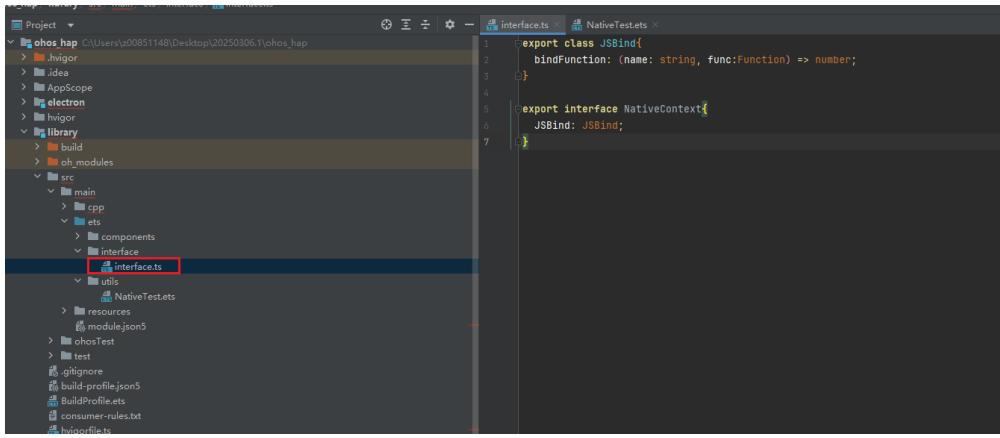
## 1 创建工程

deveco中点击File ==> New ==> Moudle ==> Static Library，创建一个Library



## 2 将adapter中的注册进行声明和初始化

### 2.1 adapter中的注册进行声明



**2.2 定义初始化和bind函数**

```

ohos.hap library src main ets utils NativeTestlets
oh-package.json5 WebAbilityStage.ets NativeTestlets
import adaptertest from 'libadaptertest.so'
import { NativeContext } from '../interface/interface'
import environment from '@ohos.file.environment'
import hilog from '@ohos.hilog'

export class JSBindingTest{
  private static currentContext: NativeContext;

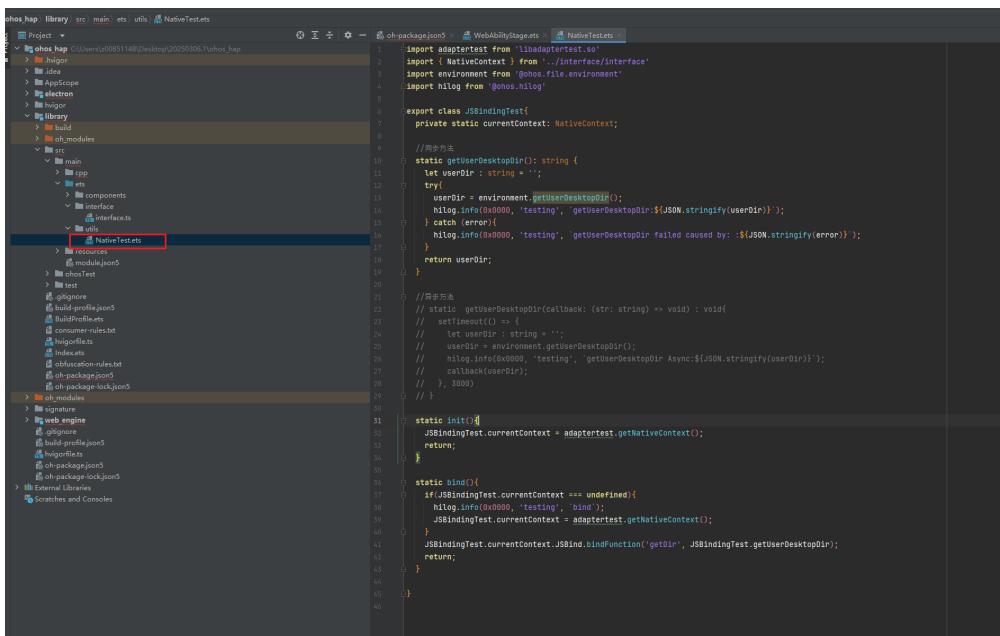
  //同步方法
  static getUserDesktopDir(): string {
    let userDir : string = '';
    try{
      userDir = environment.getUserDesktopDir();
      hilog.info(0x0000, 'testing', `getUserDesktopDir:${JSON.stringify(userDir)}`);
    } catch (error){
      hilog.info(0x0000, 'testing', `getUserDesktopDir failed caused by: ${JSON.stringify(error)} `);
    }
    return userDir;
  }

  //异步方法
  // static getUserDesktopDir(callback: (str: string) => void) : void{
  //   setTimeout(() => {
  //     let userDir : string = '';
  //     userDir = environment.getUserDesktopDir();
  //     hilog.info(0x0000, 'testing', `getUserDesktopDir Async:${JSON.stringify(userDir)}`);
  //     callback(userDir);
  //   }, 3000)
  // }

  static init(){
    JSBindingTest.currentContext = adaptertest.getNativeContext();
    return;
  }

  static bind(){
    if(JSBindingTest.currentContext === undefined){
      hilog.info(0x0000, 'testing', `bind`);
      JSBindingTest.currentContext = adaptertest.getNativeContext();
    }
  }
}

```



```

import adaptertest from 'libadaptertest.so'
import { NativeContext } from '../interface/interface'
import environment from '@ohos.file.environment'
import hilog from '@ohos.hilog'

export class JSBindingTest{
  private static currentContext: NativeContext;

  //同步方法
  static getUserDesktopDir(): string {
    let userDir : string = '';
    try{
      userDir = environment.getUserDesktopDir();
      hilog.info(0x0000, 'testing', `getUserDesktopDir:${JSON.stringify(userDir)}`);
    } catch (error){
      hilog.info(0x0000, 'testing', `getUserDesktopDir failed caused by: ${JSON.stringify(error)} `);
    }
    return userDir;
  }

  //异步方法
  // static getUserDesktopDir(callback: (str: string) => void) : void{
  //   setTimeout(() => {
  //     let userDir : string = '';
  //     userDir = environment.getUserDesktopDir();
  //     hilog.info(0x0000, 'testing', `getUserDesktopDir Async:${JSON.stringify(userDir)}`);
  //     callback(userDir);
  //   }, 3000)
  // }

  static init(){
    JSBindingTest.currentContext = adaptertest.getNativeContext();
    return;
  }

  static bind(){
    if(JSBindingTest.currentContext === undefined){
      hilog.info(0x0000, 'testing', `bind`);
      JSBindingTest.currentContext = adaptertest.getNativeContext();
    }
  }
}

```

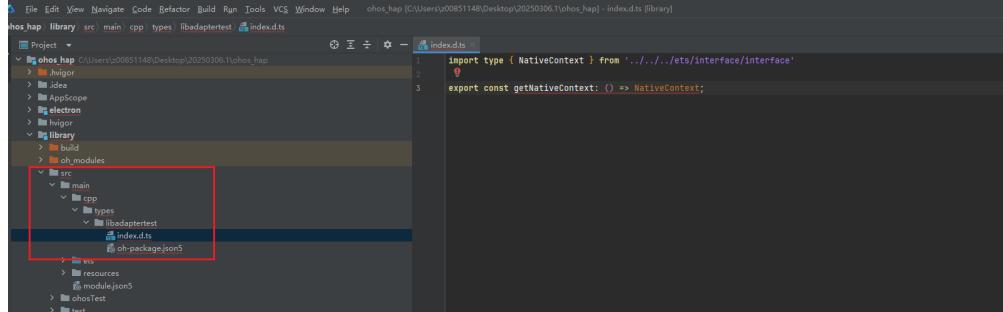
```

        }
        JSBindingTest.currentContext.JSBind.bindFunction('getDir', JSBindingTest.getUserDesktopDir);
        return;
    }
}

```

### 2.2.3 增加共享包导出声明入口

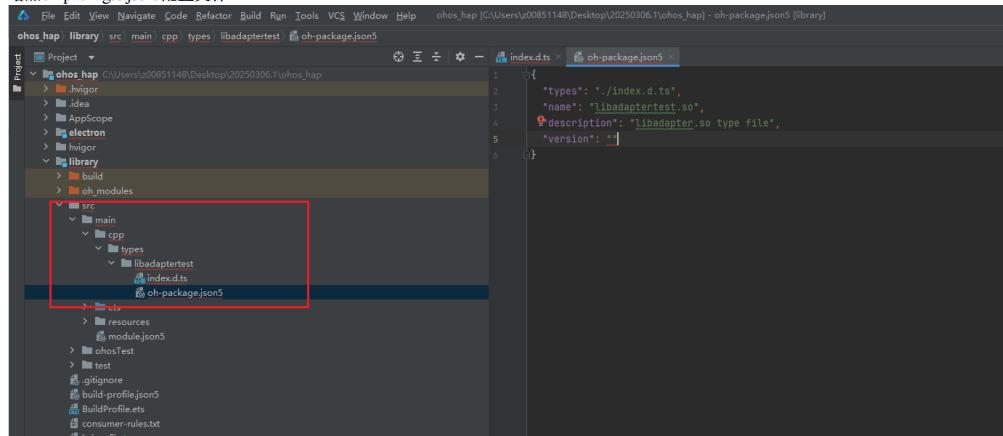
在src/main目录下创建 cpp -> types -> libadAPTERtest(根据实际修改)



```
import type { NativeContext } from '../../../../../ets/interface/interface'
```

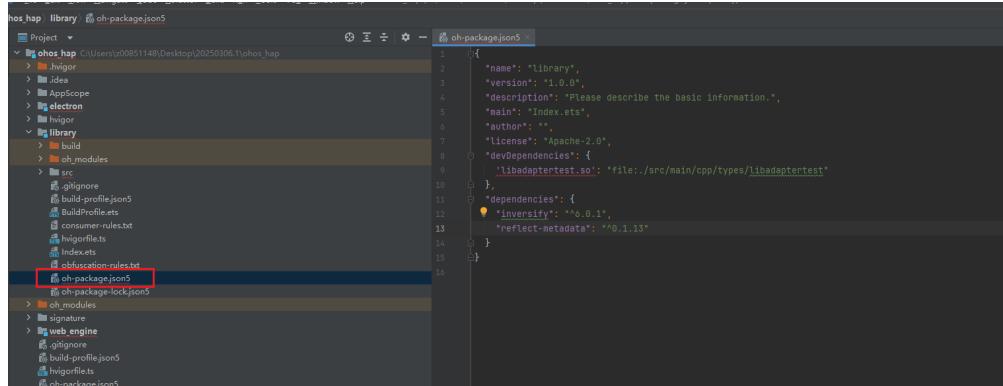
```
export const getNativeContext: () => NativeContext;
```

增加oh-packages.json5配置文件



```
{
  "types": "./index.d.ts",
  "name": "libadAPTERtest.so",
  "description": "libadAPTER.so type file",
  "version": ""
}
```

### 2.2.4 修改library根目录下的oh-packages.json5配置文件，增加引用依赖



```
{
  "name": "library",
  "version": "1.0.0",
  "description": "Please describe the basic information.",
  "main": "Index.ets",
  "author": "",
  "license": "Apache-2.0",
  "devDependencies": {
    'libadAPTERtest.so': 'file:./src/main/cpp/types/libadAPTERtest'
  },
  "dependencies": {
    'inversify': '^6.0.1',
    'reflect-metadata': '^0.1.13'
  }
}
```

### 2.2.5 修改library根目录下的Index.ets配置文件，增加导出方法

```

export { MainPage } from './src/main/ets/components/MainPage';
export { JSBindingTest } from './src/main/ets/utils/NativeTest';

```

## 2.2.6 构建har包

参考文档: [引用共享包-开发及引用共享包-应用/元服务开发-DevEco Studio - 华为HarmonyOS开发者](#)

- 在web\_engine模块中引用此HAR包 webgine/oh-packages.json5 中增加引用配置

```

{
  "name": "web_engine",
  "version": "1.0.0",
  "description": "Please describe the basic information.",
  "main": "Index.ets",
  "author": "",
  "license": "Apache-2.0",
  "devDependencies": {
    "libadapter.so": "file:./src/main/cpp/types/libadapter",
  },
  "dependencies": {
    "inversify": "^6.0.1",
    "reflect-metadata": "^0.1.13",
    "library": "file:../library"
  }
}

```

- 在WebAbilityStage.ets文件中初始化、绑定

```

import AbilityStage from '@ohos.app.ability.AbilityStage';
import { CommandType, ConfigData, ContextType } from '../common/Constants';
import JsBindingUtils from '../utils/JsBindingUtils';
import Want from '@ohos.app.ability.Want';
import lazy from '@ohos.app.ability';
import { NativeContext } from '../interface/CommonInterface';
import lazy from '@ohos/app-common';
import { CommonDependencyProvider } from '../common/CommonDependencyProvider';
import { JSBindingTest } from 'library';
import { JsBindingMethod } from '../jsbindings/JsBindingMethod';
import { JSBindingTest } from 'library';
import { JsBindingMethod } from '../jsbindings/JsBindingMethod';

const DELAYED_TIME = 0;
export class WebAbilityStage extends AbilityStage {
    private nativeContext: NativeContext | undefined = undefined;

    onCreate(): void {
        JSBindingTest.init();
        this.runTaskAsync();
    }

    onAcceptWant(want: Want): string {
        let instanceKey = want.parameters?.instanceKey;
        if (instanceKey) {
            return instanceKey.toString();
        }
        if (GlobalThisHelper.isLaunched()) {
            let result = this.nativeContext?.ExecuteCommand(
                CommandType.kGetLastActiveWidget, { is_sync: true });
            let widgetId = result?.last_widget_Id;
            if (widgetId) {
                return ConfigData.WINDOW_PREFIX + widgetId;
            }
        }
        this.context.getApplicationContext().tempDir;
        return ConfigData.DEFAULT_WINDOW_ID;
    }

    private runTaskAsync() {
        setTimeout(() => {
            JsBindingUtils.initNativeContext(ContextType.kMainProcess);
            this.nativeContext = JsBindingUtils.getNativeContext(ContextType.kMainProcess);
            if (!GlobalThisHelper.isLaunched()) {
                let appContext = this.context.getApplicationContext();
                GlobalThisHelper.appInit(new CommonDependencyProvider(appContext));
                import('../jsbindings/JsBindingMethod').then(ns=>{
                    ns.JsBindingMethod.bind();
                }).catch((e)>{
                    console.log('import failed');
                });
            }
        }, DELAYED_TIME);
    }
}

```

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// Use of this source code is governed by a BSD-style license that can be  
// found in the LICENSE file.

```

import AbilityStage from '@ohos.app.ability.AbilityStage';
import { CommandType, ConfigData, ContextType } from '../common/Constants';
import JsBindingUtils from '../utils/JsBindingUtils';
import Want from '@ohos.app.ability.Want';
import lazy from '@ohos.app.ability';
import { NativeContext } from '../interface/CommonInterface';
import lazy from '@ohos/app-common';
import { CommonDependencyProvider } from '../common/CommonDependencyProvider';
import { JSBindingTest } from 'library';
import { JsBindingMethod } from '../jsbindings/JsBindingMethod';

const DELAYED_TIME = 0;
export class WebAbilityStage extends AbilityStage {

    private nativeContext: NativeContext | undefined = undefined;

    onCreate(): void {
        JSBindingTest.init();
        this.runTaskAsync();
    }

    onAcceptWant(want: Want): string {
        let instanceKey = want.parameters?.instanceKey;
        if (instanceKey) {
            return instanceKey.toString();
        }
        if (GlobalThisHelper.isLaunched()) {
            let result = this.nativeContext?.ExecuteCommand(
                CommandType.kGetLastActiveWidget, { is_sync: true });
            let widgetId = result?.last_widget_Id;
            if (widgetId) {
                return ConfigData.WINDOW_PREFIX + widgetId;
            }
        }
        this.context.getApplicationContext().tempDir;
        return ConfigData.DEFAULT_WINDOW_ID;
    }

    private runTaskAsync() {
        setTimeout(() => {
            JsBindingUtils.initNativeContext(ContextType.kMainProcess);
            this.nativeContext = JsBindingUtils.getNativeContext(ContextType.kMainProcess);
            if (!GlobalThisHelper.isLaunched()) {
                let appContext = this.context.getApplicationContext();
                GlobalThisHelper.appInit(new CommonDependencyProvider(appContext));
                import('../jsbindings/JsBindingMethod').then(ns=>{
                    ns.JsBindingMethod.bind();
                }).catch((e)>{
                    console.log('import failed');
                });
            }
        }, DELAYED_TIME);
    }
}

```

```

        GlobalThisHelper.appInit(new CommonDependencyProvider(getApplicationContext()));
    }
    import('../jsbindings/JsBindingMethod').then((ns:ESObject) => {
        ns.JsBindingMethod.bind();
    }).catch(()=>{
        console.log('import failed');
    });
}, DELAYED_TIME)
}
}

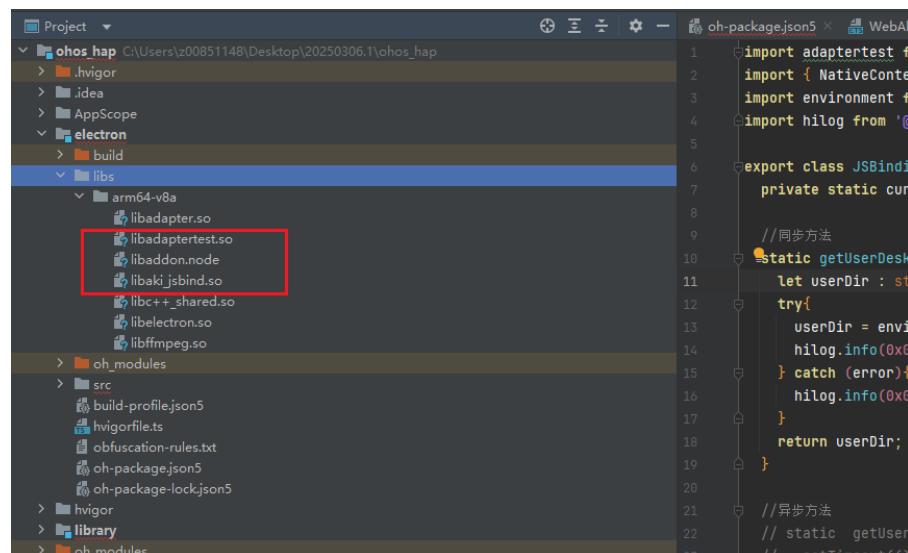
```

### 2.2.7 附加：部分目录结构介绍

- **libs**: 用于存放.so文件。
- **src > main > cpp > types**: 用于存放C++ API描述文件，子目录按照so维度进行划分。
- **src > main > cpp > types > liblibrary > Index.d.ts**: 描述C++接口的方法名、入参、返回参数等信息。
- **src > main > cpp > types > liblibrary > oh-package.json5**: 描述so三方包声明文件入口和so包名信息。
- **src > main > cpp > CMakeLists.txt**: CMake配置文件，提供CMake构建脚本。
- **src > main > cpp > napi\_init.cpp**: 共享包C++代码源文件。
- **Index.ets**: 共享包导出声明的入口。

## 五、最终调用

### 1 HAP包目录结构



```

1 import adaptertest f
2 import { NativeConte
3 import environment f
4 import hilog from '@
5
6 export class JSBindi
7     private static cur
8
9 //同步方法
10 static getUserDeskt
11 let userDir : st
12 try{
13     userDir = envi
14     hilog.info(0x0
15 } catch (error){
16     hilog.info(0x0
17 }
18 return userDir;
19
20 //异步方法
21 // static getUserD
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