

VISION SDK

Use-Case Auto-Generation Tool

User Guide

Document Revision v1.01

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1 Introduction

Vision SDK Use-Case Auto Generation tool allows users to generate C code for Vision SDK use-cases from configuration file.

This document explains procedure for writing configuration files and generating use-case files

This document assumes that the reader is familiar with basics of links and chains architecture used in Vision SDK.

2 Requirements

Install the following to use Auto Generation tool:

- Graphviz : Graphviz version 2.38.0 or higher
 - <http://www.graphviz.org/Download.php>

Install the below tools to compile and build the Auto Generation tool:

For windows,

- Install GCC compiler (v4.8.1 or higher) for Windows (ex, <http://www.codeblocks.org/>)
- Install GNU Make (v3.81 or higher) for Windows (ex, "gmake" is available as part XDC install at \$(xdc_PATH)/gmake) or <http://gnuwin32.sourceforge.net/packages/make.htm>
- Install bash shell in Windows via tool like <https://msysgit.github.io/> or Cygwin
- Flex : flex version 2.5.* or higher
 - <http://gnuwin32.sourceforge.net/packages/flex.htm>
- Bison : bison version 2.4.* or higher
 - <http://gnuwin32.sourceforge.net/packages/bison.htm>

3 Generating Use-Case files

Generating Use-Case files involves:

1. Writing Configuration file
2. Generating files

3.1 Configuration files

3.1.1 Usecase Name

- Use-case name can be mentioned in configuration file. It is used as prefix in files generated and struct and function names.

Example:

UseCase: chains_vipSingleCam_Display

3.1.2 Naming Of Link

- Every link has a particular basename, i.e. all instances of a particular type of link starts with basename. E.g.: All links of Capture type should start with basename Capture
- Basename information is available in help option (./vsdk.exe -help)
- A Link is named as Basename or Basename_suffix. For e.g Capture, Capture_1
- Different instances of a particular link have same basename but different suffix, i.e. Display_Video, Display_Grpx
- If it is algorithm link it has to be named Alg_<plugin name>_suffix. For e.g: Alg_FrameCopy_xyz
- In case link does not match any of the supported links an error will be shown.

3.1.3 Connections

- Grammar of Connections:

Connection : ID | ID -> Connection | ID ([CPU]) | ID ([CPU]) -> Connection

- Example: Single camera display

```
1 UseCase: chains_vipSingleCam_Display
2
3 Capture -> Display_Video
4 GrpSrc -> Display_Grpx
```

- Intermediate IPC are autogenerated. So, no need to mention in config file.
Example:

```
UseCase: chains_vipSingleCameraEdgeDetection
Capture -> Alg_EdgeDetect (EVE1) -> Display
```

Above Configuration file generates IPC links, which makes overall connections:

```
Capture -> IPCOut_IPU1_0_EVE1_0 -> IPCIn_EVE1_IPU_0_0 (EVE1) ->  
Alg_EdgeDetect(EVE1) -> IPCOut_EVE1_IPU1_0_0 (EVE1)->  
IPCIn_IPU_0_EVE1_0 -> Display
```

3.2 Generating Files

- To generate usecase files, type:
 - `./vsdk.exe -file configFile`
 - This generates file in the folder where command is executed
- To generate usecase files in an “output” folder, type:
 - `./vsdk -file configFile -path ./output`
- To generate image along with file, type:
 - `./vsdk -file -img configFile`
- Other options supported are:
 - `-help` Shows help regarding supported cmd line options, links and CPU
 - `-v` Verbose

3.3 Error Handling

Error is handled in following cases:

- Input file is not present
- Wrong number of input or output is provided to a link
- Link is assigned Invalid CPU or two different CPU
- Naming of Link does not follow the rules, i.e. Basename, Basename_suffix

4 Tool Development

This section describes how to extend the tool by modifying its source code.

If you are a user of the tool, then you can skip this section

4.1 Adding support for new link in the tool

To create a new Link class:

1. In link.h create new class in following format:

```
class LinkName: public Link {
    ~LinkName ();
public:
    LinkName(string nm);
    void genIncludes(ostream &fp);
    void genLinkID(ostream &fp);
    void genCreatePrms(ostream &fp);
    void genResetLinkPrms(ostream &fp, string obj);
    void genSetLinkPrms(ostream &fp, string obj);

    int setInLink(Link* obj);
    int setOutLink(Link* obj);
};
```

2. In processor.h, introduce extra enum in ClassType, cLinkName
3. Implement the functions in link.cpp file:

- a. Constructor:

```
LinkName(string nm){
    cType = cLinkName; //cType is classType which is set in Processor.h
    name = nm;
    linkIDName = name + string("LinkID");
    prmName = name + string("Prm");
    execPos = -1;
    procID = -1;
    pType = IPU1_0; //default processor type
    mulInQue = false; //set to true if the link can have multiple input
    mulOutQue = false; //set to true if the link can have multiple output
}
```

- b. genIncludes: Include the header file where the link is implemented

```
void LinkName::genIncludes(ostream &fp) {
    fp << "headerName.h"<< endl;
}
```

- c. genLinkID : Not required to change

```
void LinkName::genLinkID(ostream &fp) {
    fp << BLOCK_SPACE << setw(10) << left << "UInt32" << linkIDName << ";"
    << endl;
}
```

- d. `genCreatePrms` : Modify `LinkName _CreateParams` with actual `CreateParams` struct name

```
void LinkName::genCreatePrms(ostream &fp) {
    fp << BLOCK_SPACE << setw(40) << left << " LinkName _CreateParams " <<
    prmName << ";" << endl;
}
```

- e. `genResetLinkPrms` : Modify `LinkName _CreateParams_Init` function name

```
void LinkName::genResetLinkPrms(ostream &fp, string obj) {
    fp << BLOCK_SPACE << " LinkName _CreateParams_Init(&" << obj << "->"
    << prmName << ");" << endl;
}
```

- f. `setInLink` : Leave the function as it is. Uncomment in case you want to introduce error if number of incoming links exceeds `maxIncoming`. Also, replace `maxIncoming` with actual number

```
int LinkName::setInLink(Link* obj) {
    //CHECK_ERROR_ABORT(inLink.size() >= maxIncoming, "Error: "+name+" Link
    //should not have more than "+maxIncoming+" ingoing links");
    inLink.push_back(make_pair(obj, -1));
    if(inLink.size() > 1)
        mulInQue = true;
    return (inLink.size() - 1);
}
```

- g. `setOutLink`: Same rules as `setInLink`

```
int LinkName::setOutLink(Link* obj) {
    //CHECK_ERROR_ABORT(outLink.size() >= maxOutGoing, "Error:
    //" + name + " Link should not have more than "+maxOutGoing+" outgoing links");
    outLink.push_back(make_pair(obj, -1));
    return (outLink.size() - 1);
}
```

- h. `genSetLinkPrms`: Can set any parameters for the link

```
void LinkName::genSetLinkPrms(ostream &fp, string obj)
{
}
```

4. In `processor.cpp` `getLinkID` function, introduce an extra case in switch. Replace `ID` with `LinkID` which needs to be assigned. Other switch cases serve as an example.

```
case cDecode:
    linkIDName = ID;
    linkIDAsgn[cType]++;
    break;
```

5. In `usecase.cpp` in `createNewObj` function, include a new condition. Where "NewLinkBase" is the base name and `NewLink` is the class created.

```
else if (root == "NewLinkBase")
```



```
obj = new NewLink(name);
```

6. In options.cpp in process_Options function, add a new text string for the newly added link. Where "NewLinkBase" is the new link that is added
string usage =
...
" Supported Links: \n"
...
" NewLinkBase\n"

4.2 Adding support for new Algorithm Plugin in the tool

To develop a new Algorithm:

1. Follow all the steps in developing new link above except 5th. Preferably name class as Alg_LinkName
2. In processor.cpp getProcID introduce a new case to validate the CPU.
3. In usecase.cpp, in createNewObj function, include a new condition inside Alg condition.

e.g:

```
else if (root == "Alg") { //insert condition inside Alg Condition
    string sec = getSecRoot(name);
    if (sec == "NewLinkBase") //NewLinkBase is the base name of Alg link
        obj = new Alg_NewLink(name); // Alg_NewLink is class of new Alg
}
```