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Generic Transport Layer Interface

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Generic Transport Layer Interface

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GenTL Overview

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Generic Transport Layer Interface

Provides a technology agnostic API to enumerate and control devices (cameras) and acquire (image)data.

- **C-API**
- **No Device Functionality**
- **Uses GenApi to configure**
- **Interacts closely with GenApi**

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GenTL Wording

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GenTL Producer

A GenTL Producer is the implementation of a GenTL interface in form of a dynamic link library. It provides enumeration, control and image acquisition services.

GenTL Consumer

A GenTL Consumer is a library or application which is able to access / use the interface provided by a GenTL Producer.

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GenTL Modules internal structure

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GenTL Modules

- System — Abstraction of the Host
- Interface — Abstraction of a single interface board
- Device — Abstraction of a single device
- Stream — Abstraction of a data source on a device
- Buffer — Representing the buffer which receives the data

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GenTL Module Enumeration & Instantiation

Open the GenTL Producer

```
HMODULE hDll = LoadLibrary(TLPath.c_str());
if (hDll == NULL)
{
  cerr << "Error loading TL Client: " << TLPath.c_str() << endl;
  return NULL;
}


TL_HANDLE hTl = NULL;
if (Client::TLOpen(&hTl) < 0)
{
  cerr << "Error loading TL\n";
  return hTl;
}
```

Instantiate Module

```
if (TLGetNumInterfaces(hTl, &iNumInterfaces) < 1)
  return NULL;


char szBuffer[1024];
size_t iSize = 1024;
// retrieve name of interface with index 0
status = TLGetInterfaceID(hTl, 0, szBuffer, &iSize);
if (status < 0)
{
  cerr << "Error retrieving interface name\n";
}

// Open th interface
status = TLOpenInterface(hTl, szBuffer, &hInterface);
if (status < 0)
{
  cerr << "Error opening interface name\n";
}
```

GenTL Module Configuration

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Basic Module parameter inquiry through C API.

The C API provides functions in each module to inquire basic settings. This interface does not allow setting any of these parameters.

Advanced Module configuration through GenApi access.

The Module configuration (parameter setting) is done through a GenICam interface. Each module provides a “virtual” register map and a GenICam XML to describe that register map.

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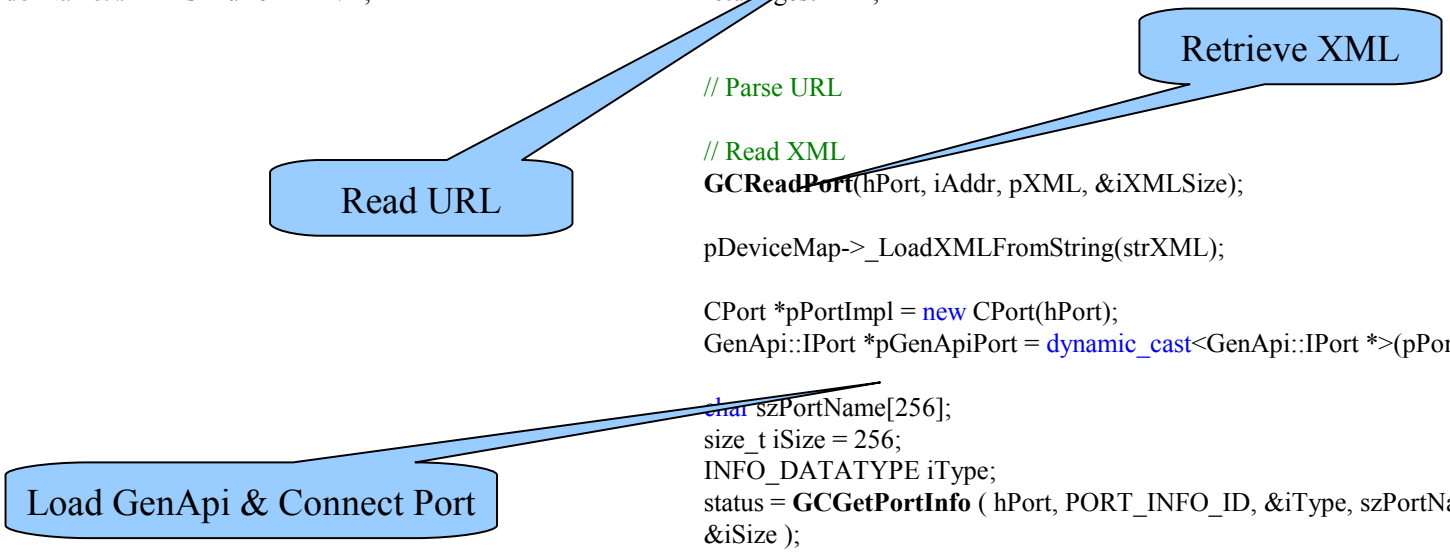
GenTL Module Configuration

Using Info Functions

```
status = TLGetInfo ( hTl, TL_INFO_VENDOR, &iType, szBuffer, &iSize );
if (status >= 0)
{
  cout << " VendorName:\t " << szBuffer << "\n";
}
```

Using GenApi Module access

```
iUrlLength = 2048;
status =  GCGetPortURL( hPort, sURL, &iUrlLength );
if (strlen(sURL) > 2047)
return gcstrXml;

// Parse URL

// Read XML
GCReadPort(hPort, iAddr, pXML, &iXMLSize);

pDeviceMap->_LoadXMLFromString(strXML);

CPort *pPortImpl = new CPort(hPort);
GenApi::IPort *pGenApiPort = dynamic_cast<GenApi::IPort *>(pPortImpl);

char szPortName[256];
size_t iSize = 256;
INFO_DATATYPE iType;
status = GCGetPortInfo ( hPort, PORT_INFO_ID, &iType, szPortName,
&iSize );

gcstring gcstrPortName = "Device"/*szPortName*/;
bool bResult = pDeviceMap->_Connect(pGenApiPort, gcstrPortName);
```



GenTL Signaling

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Each Module provides an Event Signaling Mechanism.

This allows the GenTL Consumer to wait for defined event types from within the thread context of the calling application. Such an event can carry arbitrary data.

For Example after a buffer is filled in the acquisition engine a “NewBuffer” event is signaled to the GenTL Consumer. The GenTL Consumer can now fetch the data associated with the event to know which buffer has been filled and process the data.

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GenTL Acquisition Interface

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Generic Acquisition Interface

The GenTL Producer does not need to interpret the buffer.
Therefor ANY data can be acquired.

But

It can interpret the buffer to
do some preprocessing

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GenTL Signaling

```
// Register New Buffer Event
void *NewImageEventData[2];
EVENT_HANDLE pEventNewBuffer = NULL;
status = GCRegisterEvent       ( hDatastream, EVENT_NEW_BUFFER, &pEventNewBuffer);

.....

status = EventGetData(pEventNewBuffer, &NewImageEventData, &iSize, 500);

if ( status  == GenICam::Client::GC_ERR_TIMEOUT)
{
  cout << "Timeout" << endl;
}
else if ( status  < 0)
{
  cout << "Error" << endl;
  ......
}
else
{
  cout << "NewImage: " << NewImageEventData[1] << endl;
  ....
}
```

Register Event

Wait for event

GenTL Acquisition Interface

- Announce Buffer
- Queue Buffer for Acquisition
- StartAcquisition
- Wait for Buffer
  - …
- Queue Buffer for Acquisition
- StopAcquisition
- RevokeBuffer

GenTL Buffer Handling

Allocating , Announcing and Queuing

```
BUFFER_HANDLE pB = NULL;
for (int i = 0; i < 2; i++)
{
        pImageBuffer[i] = malloc(iImageSize);

        status = DSAnnounceBuffer       ( hDatastream, pImageBuffer[i], iImageSize, (void *)i, &pB);
        if (status < 0) { HandleError( "Error in DSAnnounceBuffer: "); return;}

        status = DSQueueBuffer          ( hDatastream, pB);
        if (status < 0) { HandleError( "Error in DSQueueBuffer: "); return;}
}
```

GenTL Start Acquisition

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Starting the Acquisition

```
// Start Acquisition
status = DSStartAcquisition(hDatastream, ACQ_START_FLAGS_DEFAULT, INFINITE);
if (status < 0) { HandleError( "DSStartAcquisition failed: " ); return;}

CCommandPtr ptrStartAcq= pDeviceMap->_GetNode("AcquisitionStart");
(*ptrStartAcq).Execute();
```

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GenTL Acquisition Loop

```
while (bRun)
{
  size_t iSize = sizeof(NewImageEventData);
  status = EventGetData(pEventNewBuffer, &NewImageEventData, &iSize, 500);

  if ( status  == GenICam::Client::GC_ERR_TIMEOUT)
  {
        // Timeout
  }
  else if ( status  < 0)
  {
        // Error
  }
  else
  {
    // Process Image Data
    status = DSQueueBuffer          ( hDatastream, NewImageEventData[0]);
  }
}
```

GenTL Acquisition Shutdown

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```
// Stop Acquisition
status = DSStopAcquisition(hDatastream, ACQ_STOP_FLAGS_DEFAULT);
if (status < 0) { HandleError( "DSStopAcquisition failed: " ); return;}

// Stop Remote Device
CCommandPtr ptrStopAcq= pDeviceMap->_GetNode("AcquisitionStop");
(*ptrStopAcq).Execute();

// Cleanup
status = DSFlushQueue          ( hDatastream,
ACQ_QUEUE_INPUT_TO_OUTPUT);
if (status < 0) { HandleError( "DSFlushQueue failed: " ); return;}

status = DSFlushQueue          ( hDatastream, ACQ_QUEUE_OUTPUT_DISCARD);
if (status < 0) { HandleError( "DSFlushQueue failed: " ); return;}
```

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GenTL Compliance

- GenICam Trac
  - Discussions
  - Bugs
- Test Framework
  - In SVN
- Simple Demo Implementation
- Standard Text
  - V 1.1, RC for 1.2 is out
- Plugfest

GenTL Features

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- Technology Agnostic
- Any number of devices
- Any number of data streams per device
- Data streams of any data type
- Using GenTL Consumer Thread environment
- Allows multithreaded processing
- Flexible Cofiguration Mechanism

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Thank you for your attention!

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