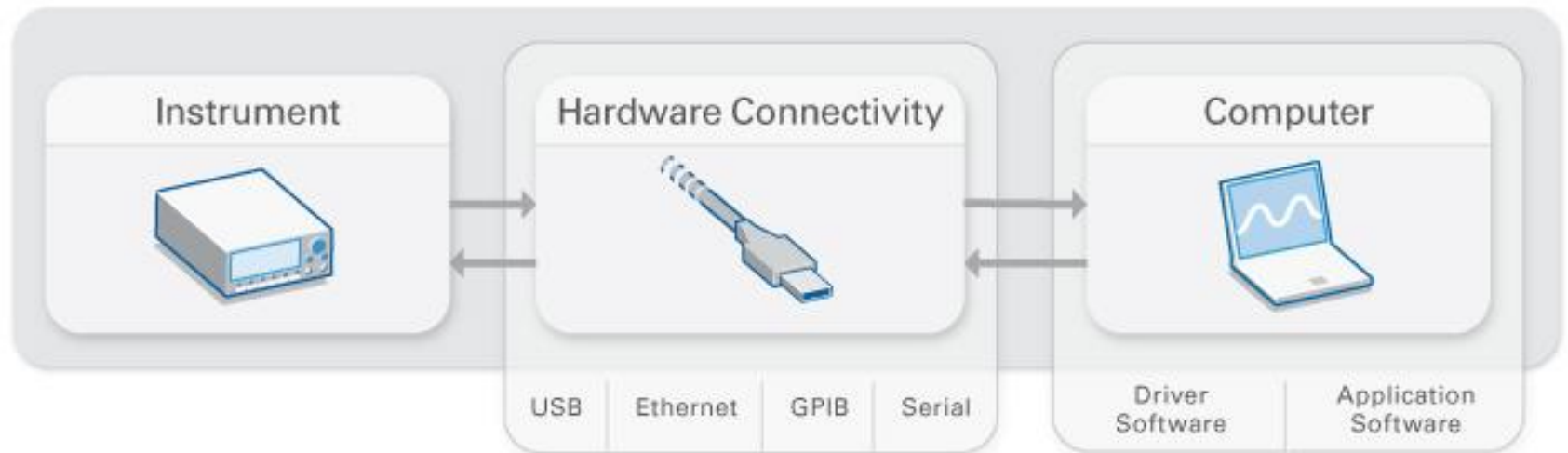


Instrument control

- Instrument control
- Standard Commands for Programmable Instrumentation
- Instrument control using LabVIEW
- NI-MAX

Instrument control



Standard Commands for Programmable Instrumentation (SCPI)

- Language to control instruments
- Provides a common syntax, command structure and data interchange format
- Commands that are recognized by the instruments
- Instrument independent
- Use with GPIB, RS-232, ethernet, USB, etc

SCPI commands

- Three kinds of commands
 - Set commands
 - Set the horizontal scale to 5 ms/div
 - Query commands
 - What is the horizontal scale of the oscilloscope?
 - Set and query commands
 - Calibrate the instrument and return the results of the calibration

SCPI command syntax

<value>	(< >) specify a value
{choice 1 choice2 choice 3}	({ }) enclose parameter choices
{choice 1 choice2 choice 3}	() separates the parameter choices
?	(?) indicates a query
[optional]	([]) optional can be omitted

HORizontal:MAIn:SCAle

Sets the time per division for the main time base. This command is equivalent to setting SEC/DIV when Main is selected from the Horizontal menu.

Group

Horizontal

Syntax

HORizontal:MAIn:SCAle <NR3>

HORizontal:MAIn:SCAle?

- **HORizontal:MAIn:SCAle 5e-3**
Set the horizontal scale to 5ms
- **HORizontal:MAIn:SCAle?**
Request the horizontal scale

TRIGger:MAIn:EDGE:SLOpe

Selects a rising or falling slope for the edge trigger. This is equivalent to setting the Slope option in the Trigger menu.

Group

Trigger

Syntax

TRIGger:MAIn:EDGE:SLOpe { FALL | RISE }

TRIGger:MAIn:EDGE:SLOpe?

- TRIGger:MAIn:EDGE:SLOpe FALL
Select a falling slope for the edge trigger

SCPI command syntax

- Send more than one command at once
- When the commands belong to the same subsystem

1. TRIGger:MAIn:EDGE:SLOpe FALL
2. TRIGger:MAIn:EDGE:SOURce CH1

Alternative 1:

TRIGger:MAIn:EDGE:SLOpe FALL;:TRIGger:MAIn:EDGE:SOURce CH1

Alternative 2:

TRIGger:MAIn:EDGE:SLOpe FALL; SOURce CH1

SCPI command syntax

- Send more than one command at once
- When the commands belong to the different subsystem

1. HORizontal:MAIn:SCAle **5e-3**
2. TRIGGer:MAIn:EDGE:SOURce CH1

Only one alternative :

HORizontal:MAIn:SCAle **5e-3** ;:TRIGGer:MAIn:EDGE:SOURce CH1

SCPI command syntax

- Mnemonics
 - Only the upper case letters are required

HORizontal:MAIn:SCAle **5e-3**

HOR:MAI:SCA **5e-3**

hor:mai:sca **5e-3**

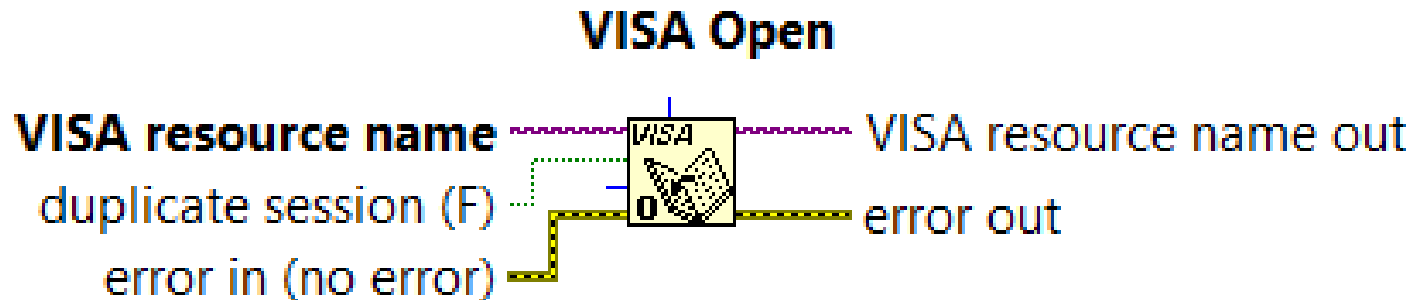
Instrument control

- Instrument control
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- **Instrument control using LabVIEW**
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Instrument control using LabVIEW

- **VISA (Virtual Instrument Software Architecture)**
 - Programming interface between hardware and development environments
 - Use with many bus interfaces: GPIB, Serial, Ethernet, and/or USB interface
-
- 1) Open a session to a given Resource
 - 2) Do any configuration on the given resource
 - 3) Perform writes and reads to the device
 - 4) Close the session to the Resource
 - 5) Handle any errors that may have occurred

VISA open

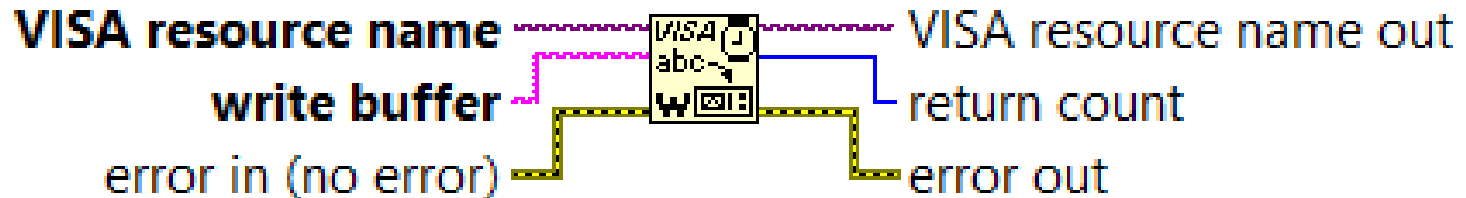


Open a session to a given resource

- **VISA resource name** resource to be opened
- **error in/error out**

VISA write

VISA Write

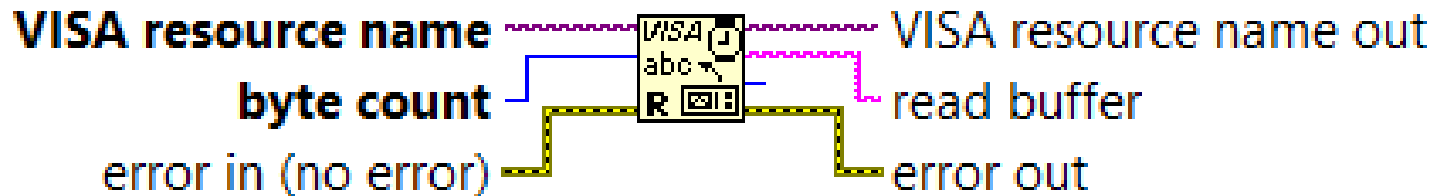


Send commands/data to the device

- **write buffer** data/command to be written to the device
- **error in/error out**

VISA read

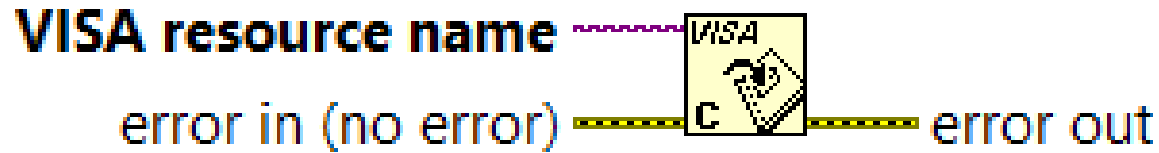
VISA Read



- **byte count** is the number of bytes to be read
- **read buffer** contains the data read from the device.
- **error in/error out**

VISA close

VISA Close

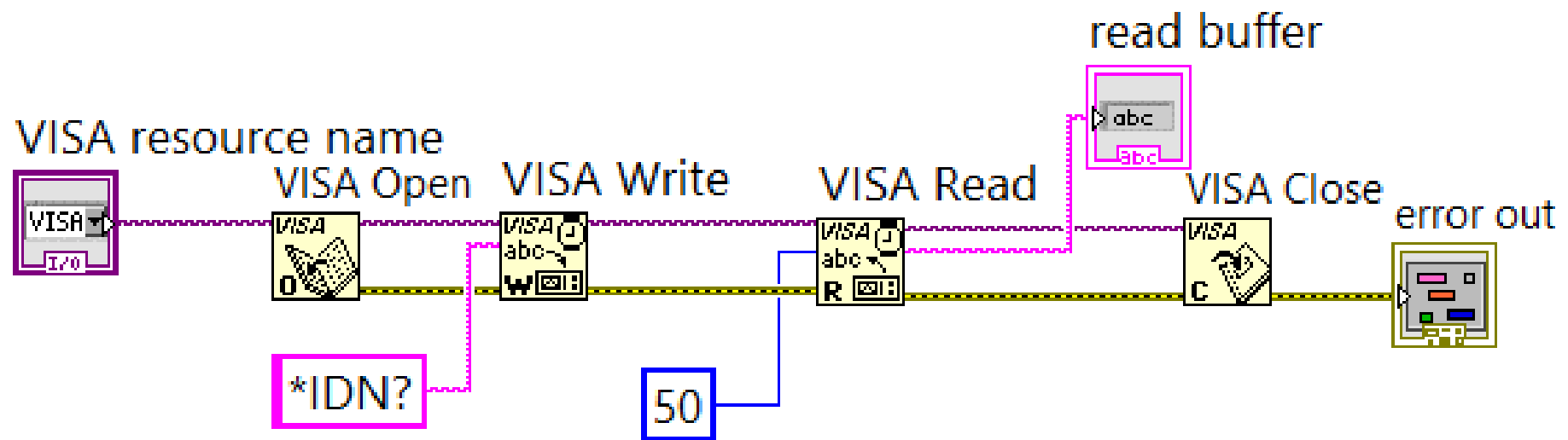


Close the session

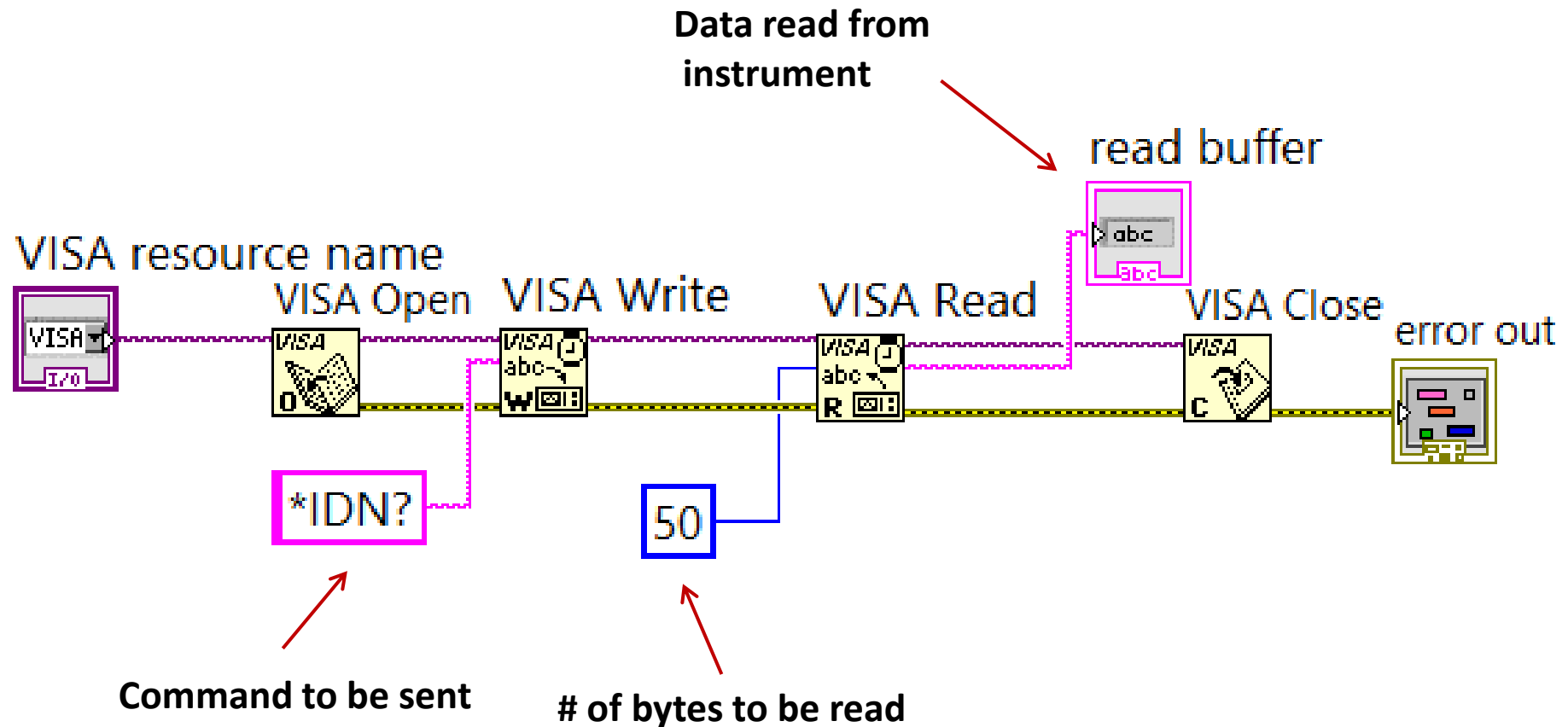
- **error in/error out**

VISA Open and **VISA close** may be omitted in
LabVIEW

Example

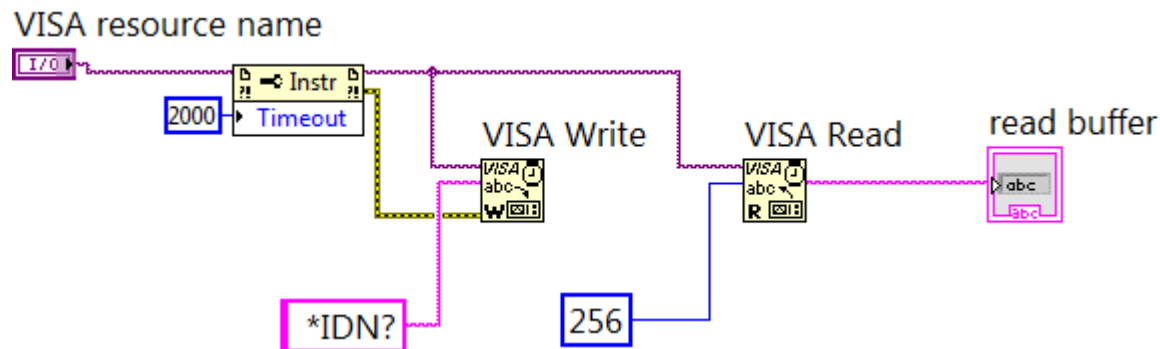
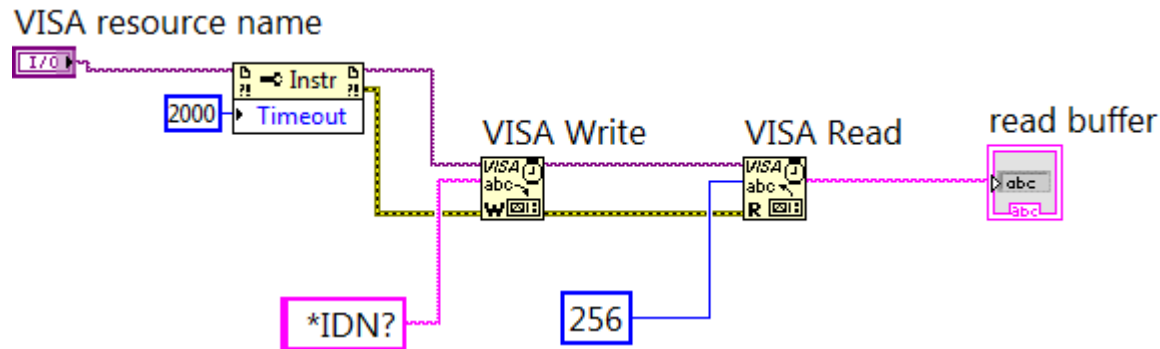


Example



Error cluster to control dataflow

- Function is executed when it has all the inputs available



Instrument control

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- **NI-MAX**

NI measurement & automation explorer (NI-MAX)

- View devices and instruments connected to your system

My System

- ▶ Data Neighborhood
- ▶ Devices and Interfaces
- ▶ Scales
- ▶ Software
- ▶ IVI Drivers
- ▶ Remote Systems

Save Refresh

Hide Help

System Settings

Hostname	CE-LIN57
DNS Name	CE-LIN57.net.chalmers.se
Vendor	Dell Inc.
Model	OptiPlex 9020
Serial Number	466LQ52
Firmware Version	A11
Operating System	Microsoft Windows 7 Enterprise (Service Pack 1)
System Start Time	2/29/2016 3:38:52 PM
Description	
System Configuration Web Access	Local Only

System Resources

Total Physical Memory	7,91 GB
Free Physical Memory	5,70 GB
Total Virtual Memory	15,8 GB
Free Virtual Memory	13,7 GB
Primary Disk Capacity	736 GB
Primary Disk Free Space	591 GB

Settings

Back

National Instruments
Measurement &
Automation Explorer

Measurement & Automation Explorer (MAX) provides access to your National Instruments products.

What do you want to do?

[Manage my devices and interfaces](#)[Manage my installed National Instruments software](#)[Manage virtual channels or tasks for my devices](#)[Create scales for my virtual instruments](#)[Configure my IVI instrument drivers](#)[Import/export my device configuration file.](#)

Note Some categories are device specific. For example, the IVI category appears only if you have IVI installed.

For more information about using MAX, select available [help](#) categories from the **Help** menu. If you need further assistance or want to know more about your device, visit the National Instruments [Technical Support website](#).

For more information about this version of MAX, launch the [readme](#) or visit [ni.com/info](#) and enter the following Info Codes:

File Edit View Tools Help

- My System
 - Data Neighborhood
 - Devices and Interfaces
 - ASRL1::INSTR "COM1"
 - ASRL3::INSTR "COM3"
 - ASRL10::INSTR "LPT1"
 - Tektronix TBS 1052B-EDU "U"**
 - NI PCI-6014 "Dev1"
 - Network Devices
 - Scales
 - Software
 - IVI Drivers
 - Remote Systems

Save Refresh Open VISA Test Panel

Hide Help

Settings

Name	
Vendor	Tektronix, Inc.
Model	Tektronix TBS 1052B-EDU
Serial Number	0C013403
Status	Present
USB Interface Number	0
488.2 Compliant	☒
VISA Resource Name	USB0::0x0699::0x0368::C013403::INSTR

Back

What do you want to do?

- ▶ [Rename my resource](#)
- ▶ [Communicate with my resource](#)
- ▶ [View and edit properties for my resource](#)

Settings General

USB0::0x0699::0x0368::C013403::INSTR - VISA Test Panel

Configuration Input/Output Advanced NI I/O Trace Help NATIONAL INSTRUMENTS

Basic I/O Line Control USB Control

Select or Enter Command *IDN?\n

*IDN?\n Bytes to Read 1024

Write Query Read Read Status Byte Clear

View mixed ASCII/hexadecimal

1: Write Operation (*IDN?\n)
Return Count: 6 bytes

2: Read Operation
Return Count: 51 bytes
TEKTRONIX,TBS\s1052B-EDU,C013403,CF:91.1CT\sFV:v2.52\n

Copy to Clipboard Clear Buffer

Return Data
Read Operation
No Error