



## QUICK REFERENCE

# NI-DMM™ Instrument Driver

## Initialize and Close


| ICON  | TYPE  | PARAMETER    | VALUE TO SET, COMMENTS <sup>1</sup>   |
|---|---|--------------|---|
|  | <b>niDMM Initialize<sup>2</sup></b><br>(niDMM_init) |              |   |
|   |   |              | Creates a new session to the instrument.  |
|   | ViRsrc  | resourceName | For Traditional NI-DAQ devices, use DAQ::#, where # is the device number.<br>For NI-DAQmx devices, the device name is assigned by Measurement & Automation Explorer (MAX). Optionally, for all devices you can use an IVI logical name. |
|   | ViBoolean   | IDQuery      | NIDMM_VAL_TRUE<br>NIDMM_VAL_FALSE   |
|   | ViBoolean   | resetDevice  | NIDMM_VAL_TRUE<br>NIDMM_VAL_FALSE   |
|   | ViSession*  | vi           | Reference to new session handle   |

|   |   |               |   |
|---|---|---------------|---|
|  | <b>niDMM Initialize with Options</b><br>(niDMM_InitWithOptions) |               |   |
|   |   |               | Creates a new session to the instrument and optionally sets the initial state of session properties.  |
|   | ViRsrc  | resourceName  | For Traditional NI-DAQ devices, use DAQ::#, where # is the device number.<br>For NI-DAQmx devices, the device name is assigned by Measurement & Automation Explorer (MAX). Optionally, for all devices you can use an IVI logical name. |
|   | ViBoolean   | IDQuery       | NIDMM_VAL_TRUE<br>NIDMM_VAL_FALSE   |
|   | ViBoolean   | resetDevice   | NIDMM_VAL_TRUE<br>NIDMM_VAL_FALSE   |
|   | ViString  | Option String | Simulate = 0, RangeCheck = 1<br>QueryInstrStatus = 1, Cache = 1   |
|   | ViSession*  | vi            | Reference to new session handle   |


<sup>1</sup> In LabWindows™/CVI™, C, and C++, constant names such as NIDMM\_VAL\_TRUE and NIDMM\_VAL\_AUTO\_ZERO\_ON refer to the use of #defines in your program. In LabVIEW, these constants refer to Boolean or ring controls with corresponding entries. For example, NIDMM\_VAL\_AUTO\_ZERO\_ON corresponds to the LabVIEW ring control entry Auto Zero On. Refer to LabVIEW Help (Show Help) for more details.


<sup>2</sup> Function name for LabWindows/CVI, C, C++, and Visual Basic.

## Initialize and Close (continued)

| ICON  | TYPE                                | PARAMETER | VALUE TO SET, COMMENTS                        |
|---|-------------------------------------|-----------|---|
|  | <b>niDMM Close</b><br>(niDMM_close) |           |   |
|   |                                     |           | Closes the current session to the instrument. |
|   | ViSession                           | vi        | Session handle                                |


## Configure








| ICON  | TYPE   | PARAMETER  | VALUE TO SET, COMMENTS                               |
|---|--|------------|--|
|  | <b>niDMM Configure Measurement</b><br>(niDMM_ConfigureMeasurement) |            |  |
|   |  |            | Configures the common properties of the measurement. |
|   | ViSession  | vi         | Session handle                                       |
|   | ViInt32  | Function   | DC volts, AC volts, and so on                        |
|   | ViReal64   | Range      |  |
|   | ViReal64   | Resolution |  |

|   |   |                 |  |
|---|---|-----------------|--|
|  | <b>niDMM Configure Multi Point</b><br>(niDMM_ConfigureMultiPoint) |                 |  |
|   |   |                 | Configures the properties for multipoint measurements. |
|   | ViSession   | vi              | Session handle   |
|   | ViInt32   | Trigger Count   | Default = 1  |
|   | ViInt32   | Sample Count    | Default = 1  |
|   | ViInt32   | Sample Trigger  | Immediate, External, TTL0, and so on                   |
|   | ViReal64  | Sample Interval | Default = Auto   |







|   |   |                |   |
|---|---|----------------|---|
|  | <b>niDMM Configure Waveform Acquisition</b><br>(niDMM_ConfigureWaveformAcquisition) |                |   |
|   |   |                | Configures the NI 4070/4071/4072 for waveform acquisitions. |
|   | ViSession   | vi             | Session handle  |
|   | ViInt32   | Function       | Voltage Waveform, Current Waveform                          |
|   | ViReal64  | Range          |   |
|   | ViReal64  | Rate           |   |
|   | ViInt32   | WaveformPoints |   |


## Measurement Options

| ICON  | TYPE  | PARAMETER           | VALUE TO SET, COMMENTS             |
|---|---|---------------------|------------------------------------|
|  | <b>niDMM Configure Powerline Frequency</b><br>(niDMM_ConfigurePowerLineFrequency) |                     |                                    |
|   |   |                     | Specifies the powerline frequency. |
|   | ViSession   | vi                  | Session handle                     |
|   | ViReal64  | Powerline Frequency | Default = 60 Hz                    |


| ICON  | TYPE   | PARAMETER  | VALUE TO SET, COMMENTS |
|---|--|--|------------------------|
|     | <b>niDMM Configure Auto Zero</b><br>(niDMM_ConfigureAutoZeroMode)                        | Configures the DMM for Auto Zero.  |                        |
|   | ViSession  | vi   | Session handle         |
|   | ViInt32  | AutoZero   | Default = Auto         |
|    | <b>niDMM Configure ADC Calibration</b><br>(niDMM_ConfigureADCCalibration)                | Allows the NI 4070/4071/4072 to compensate for gain drift since the last external or self-calibration.                       |                        |
|   | ViSession  | vi   | Session handle         |
|   | ViInt32  | ADC Calibration  | Default = Auto         |
|    | <b>niDMM Configure Offset Comp Ohms</b><br>(niDMM_ConfigureOffsetCompOhms)               | Allows the NI 4070/4071/4072 to compensate for voltage offsets in resistance measurements.                                   |                        |
|   | ViSession  | vi   | Session handle         |
|   | ViInt32  | Offset Compensated Ohms  | Default = Off          |
|    | <b>niDMM Configure AC Bandwidth</b><br>(niDMM_ConfigureACBandwidth)                      | Configures the Min Frequency and Max Frequency properties that the DMM uses for AC measurements.                             |                        |
|   | ViSession  | vi   | Session handle         |
|   | ViReal64   | Minimum Frequency  | Hz                     |
|   | ViReal64   | Maximum Frequency  | Hz                     |
|    | <b>niDMM Configure Frequency Voltage Range</b><br>(niDMM_ConfigureFrequencyVoltageRange) | Specifies the expected maximum amplitude of the input signal for frequency and period measurements on the NI 4070/4071/4072. |                        |
|   | ViSession  | vi   | Session handle         |
|   | ViReal64   | Frequency Voltage Range  | Default = AutoRange    |
|  | <b>niDMM Configure Current Source</b><br>(niDMM_ConfigureCurrentSource)                  | Configures the current source for diode measurements on the NI 4070/4071/4072.   |                        |
|   | ViSession  | vi   | Session handle         |
|   | ViReal64   | Current Source   | Default = 1.00 mA      |
|  | <b>niDMM Configure Waveform Coupling</b><br>(niDMM_ConfigureWaveFormCoupling)            | Configures instrument coupling for voltage waveforms on the NI 4070/4071/4072.   |                        |
|   | ViSession  | vi   | Session handle         |
|   | ViInt32  | Waveform Coupling  | AC or DC               |


# Capacitance and Inductance


| ICON  | TYPE  | PARAMETER          | VALUE TO SET, COMMENTS   |
|---|---|--------------------|--|
|    | <b>niDMM Configure Cable Comp Type</b><br>(niDMM_ConfigureCableCompType)                |                    |  |
|   |   |                    | Sets the Cable Compensation Type property for the current capacitance/inductance mode range on the NI 4072.                              |
|   | ViSession   | vi                 | Session handle   |
|   | ViInt32   | Cable Comp Type    |  |
|    | <b>niDMM Configure Open Cable Comp Values</b><br>(niDMM_OpenCableCompValues)            |                    |  |
|   |   |                    | Configures the Open Cable Comp Conductance and Open Cable Comp Susceptance properties on the NI 4072.                                    |
|   | ViSession   | vi                 | Session handle   |
|   | ViReal64  | Conductance        |  |
|   | ViReal64  | Susceptance        |  |
|    | <b>niDMM Configure Short Cable Comp Values</b><br>(niDMM_ConfigureShortCableCompValues) |                    |  |
|   |   |                    | Configures the Short Cable Comp Resistance and Short Cable Comp Reactance properties on the NI 4072.                                     |
|   | ViSession   | vi                 | Session handle   |
|   | ViReal64  | Resistance         |  |
|   | ViReal64  | Reactance          |  |
|    | <b>niDMM Get Dissipation Factor</b><br>(niDMM_GetDissipationFactor)                     |                    |  |
|   |   |                    | Returns the value of the Dissipation Factor property on the NI 4072.   |
|   | ViSession   | vi                 | Session handle   |
|   | ViReal64  | Dissipation Factor |  |
|   | <b>niDMM Get Quality Factor</b><br>(niDMM_GetQualityFactor)                             |                    |  |
|   |   |                    | Returns the value of the Quality Factor property on the NI 4072.   |
|   | ViSession   | vi                 | Session handle   |
|   | ViReal64  | Quality Factor     |  |
|  | <b>niDMM Perform Open Cable Comp</b><br>(niDMM_PerformOpenCableComp)                    |                    |  |
|   |   |                    | Performs the open cable compensation measurements and returns open cable compensation conductance and susceptance values on the NI 4072. |
|   | ViSession   | vi                 | Session handle   |
|   | ViInt32   | MaxTime            |  |
|   | ViReal64  | Conductance        |  |
|   | ViReal64  | Susceptance        |  |


| ICON  | TYPE   | PARAMETER  | VALUE TO SET, COMMENTS  |
|---|--|------------|---|
|  | <b>niDMM Perform Short Cable Comp</b><br>(niDMM_PerformShortCableComp) |            |   |
|   |  |            | Performs the short cable compensation measurements and returns short cable compensation resistance and reactance values on the NI 4072. |
|   | ViSession  | vi         | Session handle  |
|   | ViInt32  | MaxTime    |   |
|   | ViReal64   | Resistance |   |
|   | ViReal64   | Reactance  |   |


## Triggers

| ICON  | TYPE   | PARAMETER      | VALUE TO SET, COMMENTS                               |
|---|--|----------------|--|
|  | <b>niDMM Configure Trigger</b><br>(niDMM_ConfigureTrigger) |                |  |
|   |  |                | Configures the DMM trigger source and trigger delay. |
|   | ViSession  | vi             | Session handle                                       |
|   | ViInt32  | Trigger Source | Default = Immediate                                  |
|   | ViReal64   | Trigger Delay  | Default = Auto                                       |


|   |   |    |                                     |
|---|---|----|-------------------------------------|
|  | <b>niDMM Send Software Trigger</b><br>(niDMM_SendSoftwareTrigger) |    |                                     |
|   |   |    | Sends a command to trigger the DMM. |
|   | ViSession   | vi | Session handle                      |

|   |   |               |   |
|---|---|---------------|---|
|  | <b>niDMM Configure Trigger Slope</b><br>(niDMM_ConfigureTriggerSlope) |               |   |
|   |   |               | Sets the Trigger Slope property to either rising edge or falling edge polarity. |
|   | ViSession   | vi            | Session handle  |
|   | ViInt32   | Trigger Slope |   |


|  |  |       |  |
|--|--|-------|--|
|  | <b>niDMM Configure Sample Trigger Slope</b><br>(niDMM_ConfigureSampleTriggerSlope) |       |  |
|  |  |       | Sets the Sample Trigger Slope property to either rising edge or falling edge polarity. |
|  | ViSession  | vi    | Session handle   |
|  | ViInt32  | Slope |  |


|   |  |                                  |  |
|---|--|----------------------------------|--|
|  | <b>niDMM Configure Meas Complete Dest</b><br>(niDMM_ConfigureMeasCompleteDest) |                                  |  |
|   |  |                                  | Specifies the destination of the Measurement Complete (MC) signal. |
|   | ViSession  | vi                               | Session handle   |
|   | ViInt32  | Measurement Complete Destination | Default = None   |


## Triggers (continued)

| ICON  | TYPE   | PARAMETER | VALUE TO SET, COMMENTS   |
|---|--|-----------|--|
|  | <b>niDMM Configure Meas Complete Slope</b><br>(niDMM_ConfigureMeasCompleteSlope) |           |  |
|   |  |           | Sets the MC signal to either rising edge or falling edge polarity. |
|   | ViSession  | vi        | Session handle   |
|   | ViInt32  | Slope     |  |


## Actual Values


| ICON  | TYPE   | PARAMETER       | VALUE TO SET, COMMENTS   |
|---|--|-----------------|--|
|  | <b>niDMM Get Auto Range Value</b><br>(niDMM_GetAutoRangeValue) |                 |  |
|   |  |                 | Returns the actual range that the DMM is using, even when auto ranging is off. |
|   | ViSession  | vi              | Session handle   |
|   | ViReal64*  | autoRange Value | Output   |


|   |  |                       |  |
|---|--|-----------------------|--|
|  | <b>niDMM Get Aperture Time Info</b><br>(niDMM_GetApertureTimeInfo) |                       |  |
|   |  |                       | Returns the aperture time and aperture time units. |
|   | ViSession  | vi                    | Session handle                                     |
|   | ViReal64*  | ApertureTime          | Output   |
|   | ViInt32*   | ApertureTime<br>Units | Output (seconds or PLC)                            |


|   |   |                       |  |
|---|---|-----------------------|--|
|  | <b>niDMM Get Measurement Period</b><br>(niDMM_GetMeasurementPeriod) |                       |  |
|   |   |                       | Returns the measurement period, which is the amount of time it takes to complete one measurement with the current configuration. |
|   | ViSession   | vi                    | Session handle   |
|   | ViReal64*   | Measurement<br>Period | Output (seconds)   |

## Acquisition


| ICON  | TYPE                              | PARAMETER   | VALUE TO SET, COMMENTS  |
|---|-----------------------------------|-------------|---|
|  | <b>niDMM Read</b><br>(niDMM_Read) |             |   |
|   |                                   |             | Acquires a single measurement and returns the measured value. |
|   | ViSession                         | vi          | Session handle  |
|   | ViInt32                           | MaximumTime | Milliseconds  |
|   | ViReal64*                         | Measurement | Output  |


| ICON   | TYPE  | PARAMETER      | VALUE TO SET, COMMENTS  |
|--|---|----------------|---|
|  | <b>niDMM Read Multi Point</b><br>(niDMM_ReadMultiPoint) |                |   |
|  |   |                | Acquires multiple measurements and returns an array of measured values. |
|  | ViSession   | vi             | Session handle  |
|  | ViInt32   | Maximum Time   | Milliseconds  |
|  | ViInt32   | Number to Read | Default = 4   |
|  | ViReal64 [ ]  | Measurements   | Output  |
|  | ViInt32*  | Actual Number  | Output  |

|   |  |                |  |
|---|--|----------------|--|
|  | <b>niDMM Read Waveform</b><br>(niDMM_ReadWaveform) |                |  |
|   |  |                | Acquires a waveform and returns an array representing the digitized waveform on the NI 4070/4071/4072. |
|   | ViSession  | vi             | Session handle   |
|   | ViInt32  | Maximum Time   | Milliseconds   |
|   | ViInt32  | Number to Read | Default = 1  |
|   | ViReal64[]*  | Waveform Data  | Output   |
|   | ViInt32*   | Actual Number  | Output   |







|   |   |             |  |
|---|---|-------------|--|
|  | <b>niDMM Is Over Range</b><br>(niDMM_IsOverRange) |             |  |
|   |   |             | Takes a measurement value and determines if the value is a valid measurement or a value indicating that an overrange condition occurred. |
|   | ViSession   | vi          | Session handle   |
|   | ViReal64  | Measurement | Input  |
|   | ViBoolean*  | Over range? | Output   |

## Low-Level Acquisition


| ICON   | TYPE                                      | PARAMETER | VALUE TO SET, COMMENTS    |
|--|---|-----------|---------------------------|
|  | <b>niDMM Initiate</b><br>(niDMM_Initiate) |           |                           |
|  |   |           | Initiates an acquisition. |
|  | ViSession                                 | vi        | Session handle            |


|   |                                     |              |   |
|---|-------------------------------------|--------------|---|
|  | <b>niDMM Fetch</b><br>(niDMM_Fetch) |              |   |
|   |                                     |              | Returns the value from a previously initiated measurement. You must call niDMM Initiate before calling this VI. |
|   | ViSession                           | vi           | Session handle  |
|   | ViInt32                             | Maximum Time | Milliseconds  |
|   | ViReal64*                           | Measurement  | Output  |


## Low-Level Acquisition (continued)


| ICON  | TYPE  | PARAMETER         | VALUE TO SET, COMMENTS  |
|---|---|-------------------|---|
|    | <b>niDMM Fetch Multi Point</b><br>(niDMM_FetchMultiPoint) |                   |   |
|   |   |                   | Returns an array of values from a previously initiated multipoint measurement.              |
|   | ViSession   | vi                | Session handle  |
|   | ViInt32   | Maximum Time      | Milliseconds  |
|   | ViInt32   | Number to Fetch   | Default = 4   |
|   | ViReal64[ ]   | Measurements      | Output  |
|   | ViInt32*  | Actual Number     | Output  |
|    | <b>niDMM Fetch Waveform</b><br>(niDMM_FetchWaveform)      |                   |   |
|   |   |                   | Acquires an array of data from a waveform on the NI 4070/4071/4072.                         |
|   | ViSession   | vi                | Session handle  |
|   | ViInt32   | Maximum Time      | Milliseconds  |
|   | ViInt32   | Number to Fetch   | Default = 1   |
|   | ViReal64[ ]*  | Waveform Data     | Output  |
|   | ViInt32*  | Actual Number     | Output  |
|    | <b>niDMM Read Status</b><br>(niDMM_ReadStatus)            |                   |   |
|   |   |                   | Returns measurement backlog and acquisition status on the NI 4060 and NI 4070/4071/4072.    |
|   | ViSession   | vi                | Session handle  |
|   | ViInt32*  | Backlog           | Output  |
|   | ViInt16*  | Acquisition State | Output  |
|    | <b>niDMM Abort</b><br>(niDMM_Abort)                       |                   |   |
|   |   |                   | Aborts a previously initiated measurement and returns the DMM to the Idle state.            |
|   | ViSession   | vi                | Session handle  |
| <b>Utility</b>  |   |                   |   |
| ICON  | TYPE  | PARAMETER         | VALUE TO SET, COMMENTS  |
|  | <b>niDMM Reset</b><br>(niDMM_reset)                       |                   |   |
|   |   |                   | Resets the instrument to a known state and sends initialization commands to the instrument. |
|   | ViSession   | vi                | Session handle  |
|  | <b>niDMM Self Test</b><br>(niDMM_self_test)               |                   |   |
|   |   |                   | Performs a self-test on the DMM to ensure that the DMM is functioning properly.             |
|   | ViSession   | vi                | Session handle  |
|   | ViInt16*  | Self Test Result  | Output  |
|   | ViChar [ ]  | Self Test Message | Output  |




| ICON   | TYPE  | PARAMETER                     | VALUE TO SET, COMMENTS   |
|--|---|-------------------------------|--|
|  | <b>niDMM Revision Query</b><br>(niDMM_revision_query) |                               |  |
|  |   |                               | Returns the revision numbers of the instrument driver and instrument firmware. |
|  | ViSession   | vi                            | Session handle   |
|  | ViChar [ ]  | Instrument Driver<br>Revision | Output   |
|  | ViChar [ ]  | Firmware Revision             | Output   |

|   |   |              |   |
|---|---|--------------|---|
|  | <b>niDMM Format Measurements Absolute</b><br>(niDMM_FormatMeasAbsolute) |              |   |
|   |   |              | Formats the measurement to the proper number of displayed digits. |
|   | ViInt32   | Function     | DC volts, AC volts, and so on                                     |
|   | ViReal64  | Range        | Input   |
|   | ViReal64  | Resolution   | Input   |
|   | ViReal64  | Measurement  | Input   |
|   | ViChar [ ]  | Mode String  | Output  |
|   | ViChar [ ]  | Range String | Output  |
|   | ViChar [ ]  | Data String  | Output  |





|   |  |        |  |
|---|--|--------|--|
|  | <b>niDMM Get Digits Of Precision</b><br>(niDMM_GetDigitsOfPrecision) |        |  |
|   |  |        | Returns the digits of precision calculated from the range and resolution information specified in niDMM Configure Measurement. |
|   | ViSession  | vi     | Session handle   |
|   | ViReal64*  | Digits | Output (3.5/4.5/5.5/6.5)   |

|   |   |                                     |   |
|---|---|-------------------------------------|---|
|  | <b>niDMM Error Message</b><br>(niDMM_error_message) |                                     |   |
|   |   |                                     | Takes the error cluster returned by the VIs, interprets it, and returns it as a user-readable string. |
|   | ViSession   | vi                                  | Session handle  |
|   | ViBoolean   | Message Box<br>(Only applies to LV) | Default = Do not show dialog  |
|   | ViStatus*   | Error Code                          | Input/Output  |
|   | ViChar [ ]  | Error Message                       | Output  |

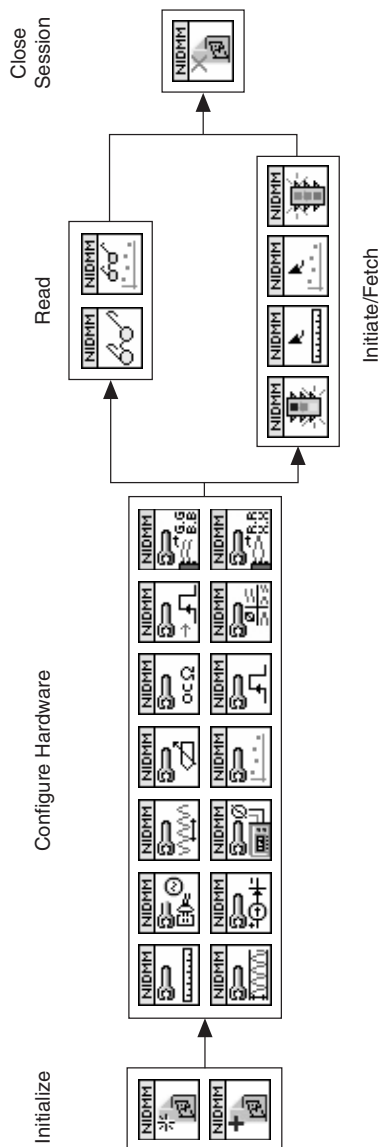
## Calibration

| ICON  | TYPE                                     | PARAMETER | VALUE TO SET, COMMENTS   |
|---|--|-----------|--|
|  | <b>niDMM Self Cal</b><br>(niDMM_SelfCal) |           |  |
|   |  |           | Executes the self-calibration routine to maintain measurement accuracy on the NI 4070/4071/4072. |
|   | ViSession                                | vi        | Session handle   |

## Calibration (continued)

| ICON  | TYPE  | PARAMETER   | VALUE TO SET, COMMENTS  |
|---|---|-------------|---|
|  | <b>niDMM Get Cal Count</b><br>(niDMM_GetCalCount)               |             | Returns the calibration count for the specified type of calibration.                    |
|   | ViSession   | vi          | Session handle  |
|   | ViInt32   | Area        | Default = Internal  |
|   | ViInt32*  | Count       | Output  |
|  | <b>niDMM Get Dev Temp</b><br>(niDMM_GetDevTemp)                 |             | Returns the current temperature of the NI 4070/4071/4072.                               |
|   | ViSession   | vi          | Session handle  |
|   | ViString  | Reserved    | " "   |
|   | ViReal64*   | Temperature | Output  |
|  | <b>niDMM Get Last Cal Temp</b><br>(niDMM_GetLastCalTemp)        |             | Returns the temperature during the last calibration procedure on the NI 4070/4071/4072. |
|   | ViSession   | vi          | Session handle  |
|   | ViInt32   | Area        | Default = Internal  |
|   | ViReal64*   | Temperature | Output  |
|  | <b>niDMM Get Cal Date and Time</b><br>(niDMM_GetCalDateAndTime) |             | Returns the date and time of the last calibration performed on the NI 4070/4071/4072.   |
|   | ViSession   | vi          | Session handle  |
|   | ViInt32   | Area        | Default = Internal  |
|   | ViInt32*  | Month       | Output  |
|   | ViInt32*  | Day         | Output  |
|   | ViInt32*  | Year        | Output  |
|   | ViInt32*  | Hour        | Output  |
|   | ViInt32*  | Minute      | Output  |

# DMM Programming Flow



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