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New MIDAS features

# New web interface to MIDAS

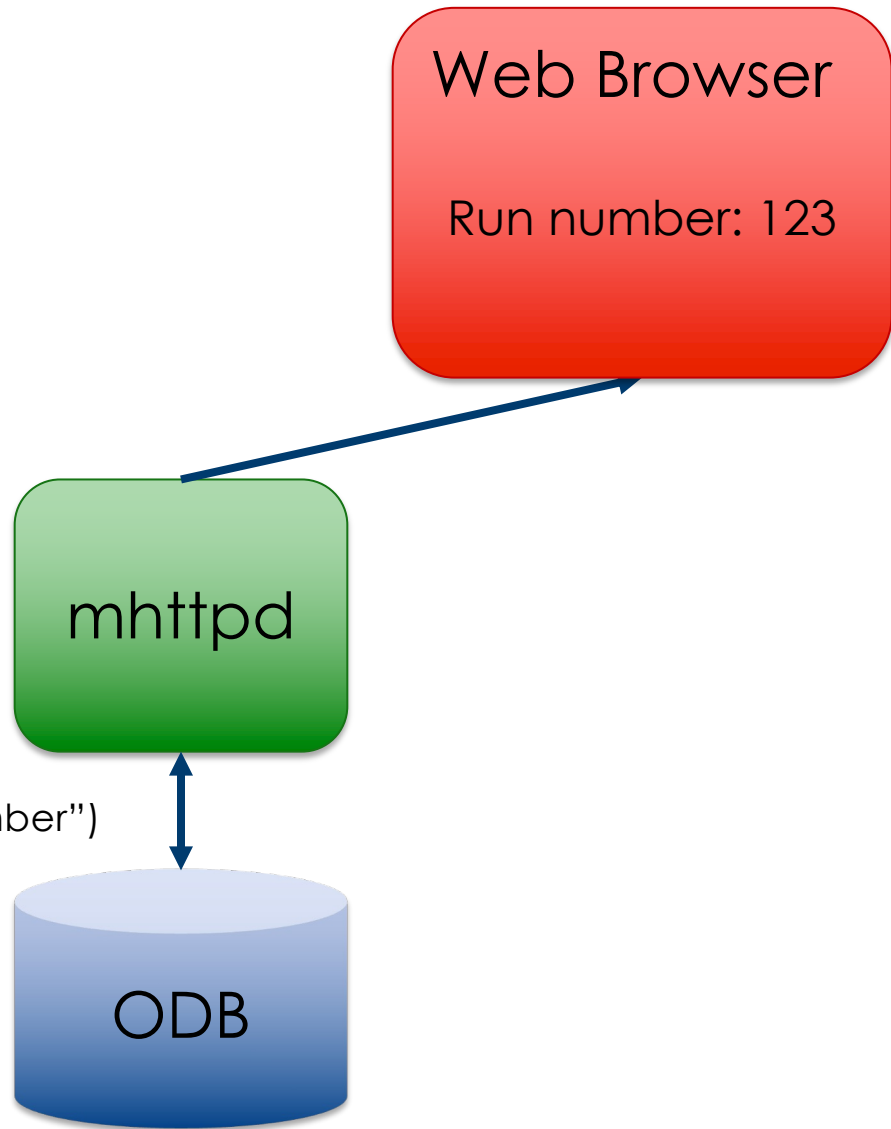
- Historically mhttpd generated HTML pages for experiments from its C code
  - Only possibility back in 1990's
  - Pages were static
  - “Custom pages” needed special syntax, limited use
- New way of doing things:
  - Extensive use of JavaScript in browsers to generate pages dynamically
  - JSON-RPC interface to ODB (KO) lets web pages interact with ODB and MIDAS
  - Each MIDAS function has a browser equivalent, e.g. `mjsonrpc_db_get_value()`, `mjsonrpc_cm_exist()`, ...
  - All mhttpd pages get converted into plain HTML pages
  - Pages can be customized easily

# The old way

```
<html>  
Run number: <div>123</div>  
</html>
```

```
db_get_value("/Runinfo/Run number")
```

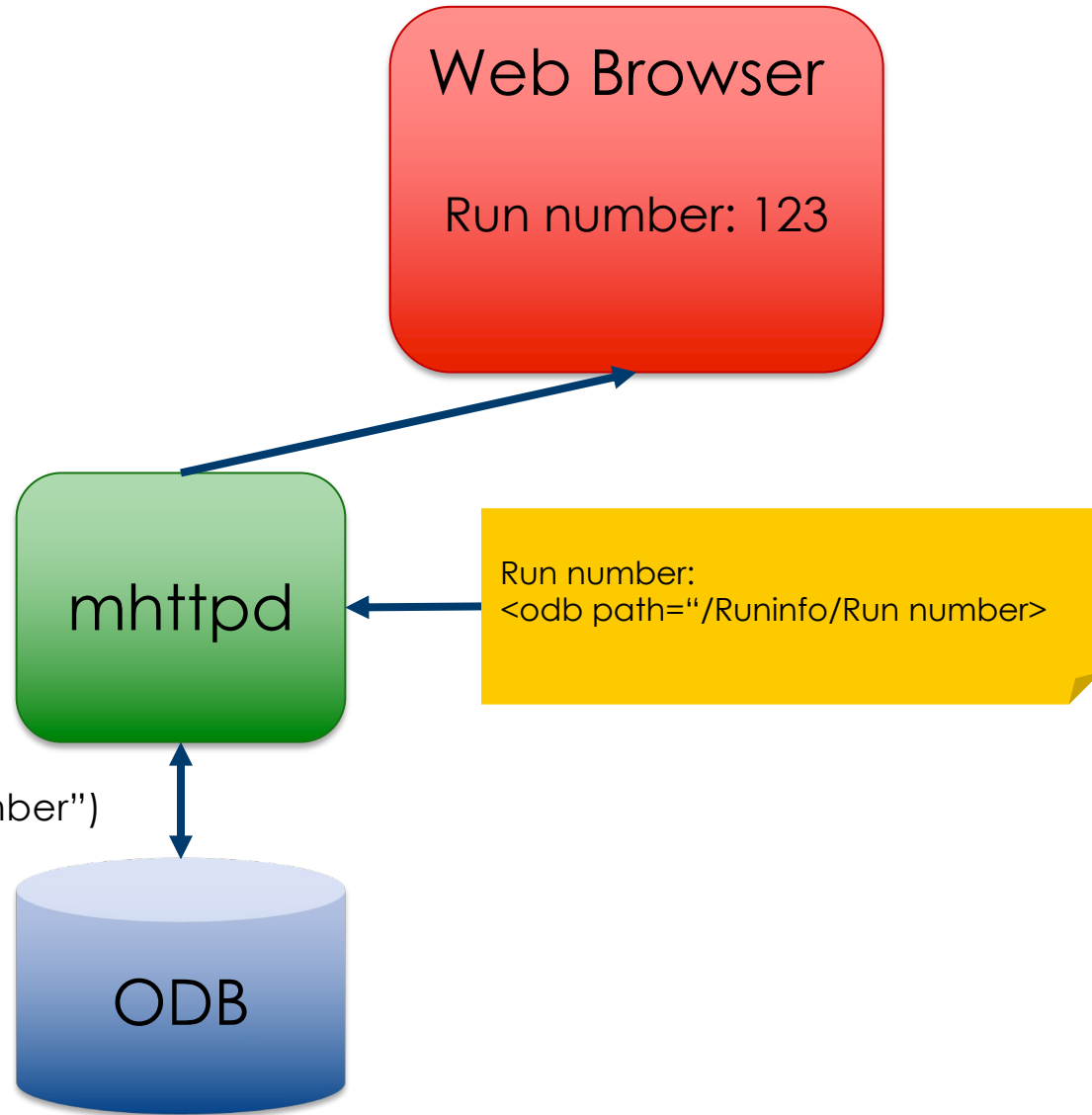
/Runinfo/Run number 123

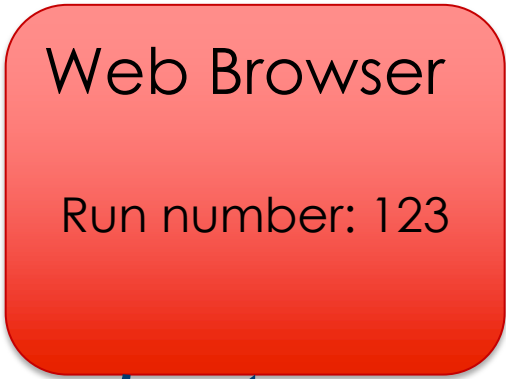


```
<html>  
Run number: 123  
</html>
```

```
db_get_value("/Runinfo/Run number")
```

```
/Runinfo/Run number: 123
```

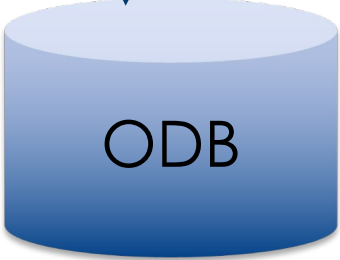




mjsonrpc\_db\_get\_value()



```
mjsonrpc_db_get_value("/Runinfo/Run number").then(function(rpc) {  
  r = rpc.result.data[0];  
})  
document.write("Run number" + run_number);
```



/Runinfo/Run number: 123

```
mjsonrpc_db_get_value("/Runinfo/Run number").then(function(rpc) {  
  r = rpc.result.data[0];  
  var r = document.getElementById("runnumber");  
  r.innerHTML = "Run number: " + run_number;  
}
```

```
<body class="mcss" onload="mhttpd_init('Test', 1000)">
```

Run number:

```
<div name="modbvalue" data-odb-path="/Runinfo/Run number"  
  data-odb-editable="1"></div>
```

# Complete example

```

<body class="mcss"
onload="mhttpd_init('Test', 1000)">

<div id="mheader"></div>
<div id="msidenav"></div>

<div id="mmain">
  <table class="mtable">
    <tr>
      <th colspan="2"
class="mtableheader">Status</th>
    </tr>
    <tr>
      <td style="width: 200px">
        Run number:
      </td>
      <td>
        <div name="modbvalue" data-odb-
path="/Runinfo/Run number" data-odb-
editable="1"></div>
      </td>

```

```

      <td>
        <div name="modbbar" style="width: 500px"
data-odb-path="/Runinfo/Run number" data-
max-value="10"
        data-color="lightgreen"></div>
      </td>
    </tr>
    <tr>
      <td>
        <button name="modbbutton"
class="mbutton" data-odb-path="/Runinfo/Run
number" data-odb-value="1">Set run
        number to 1
      </button>
      </td>
    </tr>
  </table>
</div>
</body>
</html>

```

# Resulting HTML page

☰ online Tue Jul 25 2017 14:14:43 GMT-0700 (PDT) [Help](#)

Status

Start

Transition

ODB

Messages

Chat

Alarms

Programs

History

MSCB

Sequencer

Config

Example

Help

**Status**

Run number:	5
Last run start:	Mon Jul 17 15:53:12 2017
Last run stop:	Mon Jul 17 15:53:23 2017
Indicator:	5 <div style="width: 100px; height: 15px; background-color: #90ee90; border: 1px solid #ccc;"></div>



# New Status Page (Shouyi Ma)

☰ online
Tue Jul 25 2017 14:49:06 GMT-0700 (PDT) [Help](#)

- Status
- Start
- Transition
- ODB
- Messages
- Chat
- Alarms
- Programs
- History
- MSCB
- Sequencer
- Config
- Example
- Help
- Test
- PSI ↗
- TRIUMF ↗

### Run Status

<b>Run</b> 5 <b>Stopped</b>	Start: Mon Jul 17 15:53:12 2017	Stop: Mon Jul 17 15:53:23 2017
<input type="button" value="Start"/>	Alarms: Off	Restart: No
Logger not running		
Experiment Name: online		

1501017279 14:14:39.015 2017/07/25 [mhttpd,INFO] Program mhttpd on host localhost started

### Equipment

Equipment +	Status	Events	Events[/s]	Data[MS/s]
Trigger	Sample Frontend@localhost	34714	85.4	4.672
Scaler	Sample Frontend@localhost	40	0.0	0.000
HV	Ok	2	0.0	0.000
Environment	Ok	2	0.0	0.000

### Logging Channels

Channel	Events	MiB written	Compr.	Disk Level
#0 run00018.mid	34683	1.875	98.9%	91.9%

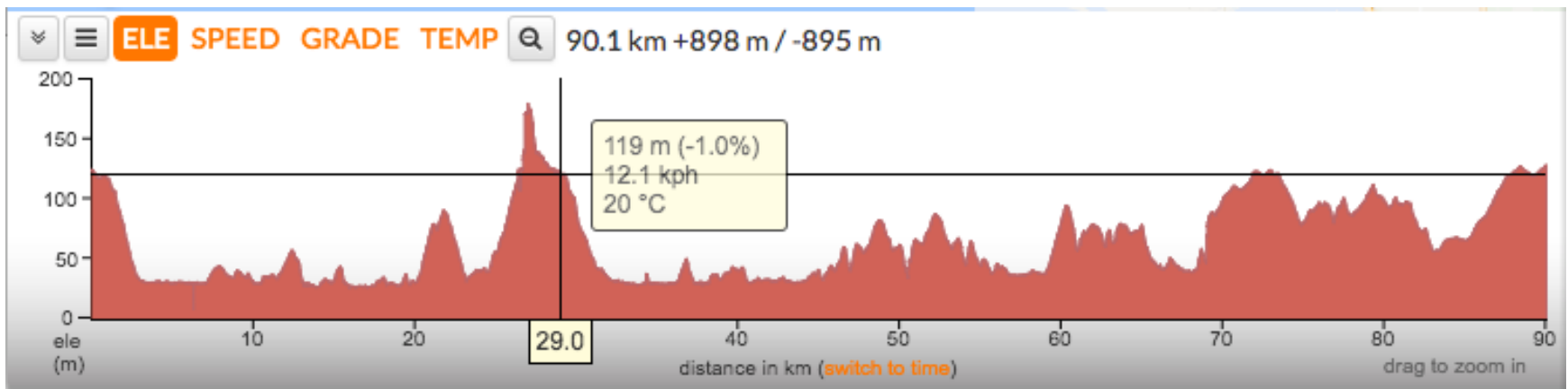
Lazy Label	Progress	File Name	# Files	Total
------------	----------	-----------	---------	-------

### Clients

ODBEdit [localhost]	mhttpd [localhost]
---------------------	--------------------

- Use special data-xxx tags for MIDAS HTML elements
  - ODB values (editable)
  - Horizontal color bar
  - Vertical color bar
  - General gauge with scales
  - Buttons to set some ODB value
  - History panel:

```
<div name="mhistory" data-panel="Temperatures"
  data-size="1000px"></div>
```



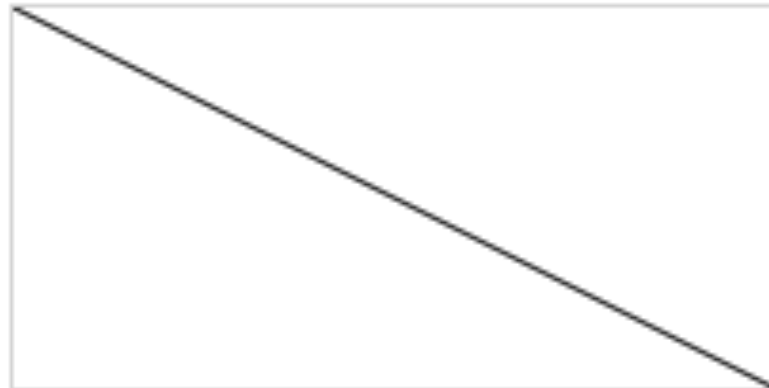
The screenshot displays the Conrad Connect web interface. At the top, there is a navigation bar with a 'Welcome' message, a 'Recipes' button, and links for 'Devices and Services', 'FAQ', and a user profile 'froscaulensy@gmail.com'. The main content area is divided into several sections:

- Left Column:**
  - 12.01.2017 Tado:** A section titled 'Tado' with the text 'Connect your Tado products and control your heating with Conrad Connect Link'. It includes an image of a Tado thermostat and a smartphone.
  - 04.01.2017 Devolo Home Control:** A section titled 'Devolo Home Control' with the text 'Connect your Devolo products immediately via our Maker Channel to Conrad Connect. This allows you to use your Devolo Home Control products as an actuator within a recipe Link'. It includes an image of Devolo smart home devices.
- Top Row of Widgets:**
  - Temperature (Temp. / Feuchte) - Demo Sensor Hirschau:** A red header widget showing a line graph of temperature and humidity over time. Below the graph are tabs for 'Day', 'Week', 'Month', and 'Year'.
  - Temperature (Temp. / Feuchte) - Demo Sensor Hirschau:** A red header widget showing a vertical thermometer gauge.
- Middle Row of Widgets:**
  - Temperature (Temp. / Feuchte) - Demo Sensor Hirschau:** A red header widget displaying a large temperature reading of **-2.1 °C**.
  - Temperature (Temp. / Feuchte) - Demo Sensor Hirschau:** A red header widget showing a semi-circular gauge.
  - Humidity (Temp. / Feuchte) - Demo Sensor Hirschau:** A blue header widget showing a semi-circular gauge.
- Bottom Row of Widgets:**
  - Wind Direction (Temp. / Feuchte) - Demo Sensor Hirschau:** A green header widget showing a compass rose.
  - Humidity (Temp. / Feuchte) - Demo Sensor Hirschau:** A blue header widget displaying a large humidity reading of **60.1 %**.
  - Wind (Temp. / Feuchte) - Demo Sensor Hirschau:** A green header widget displaying a large wind speed reading of **3.8 m/s**.

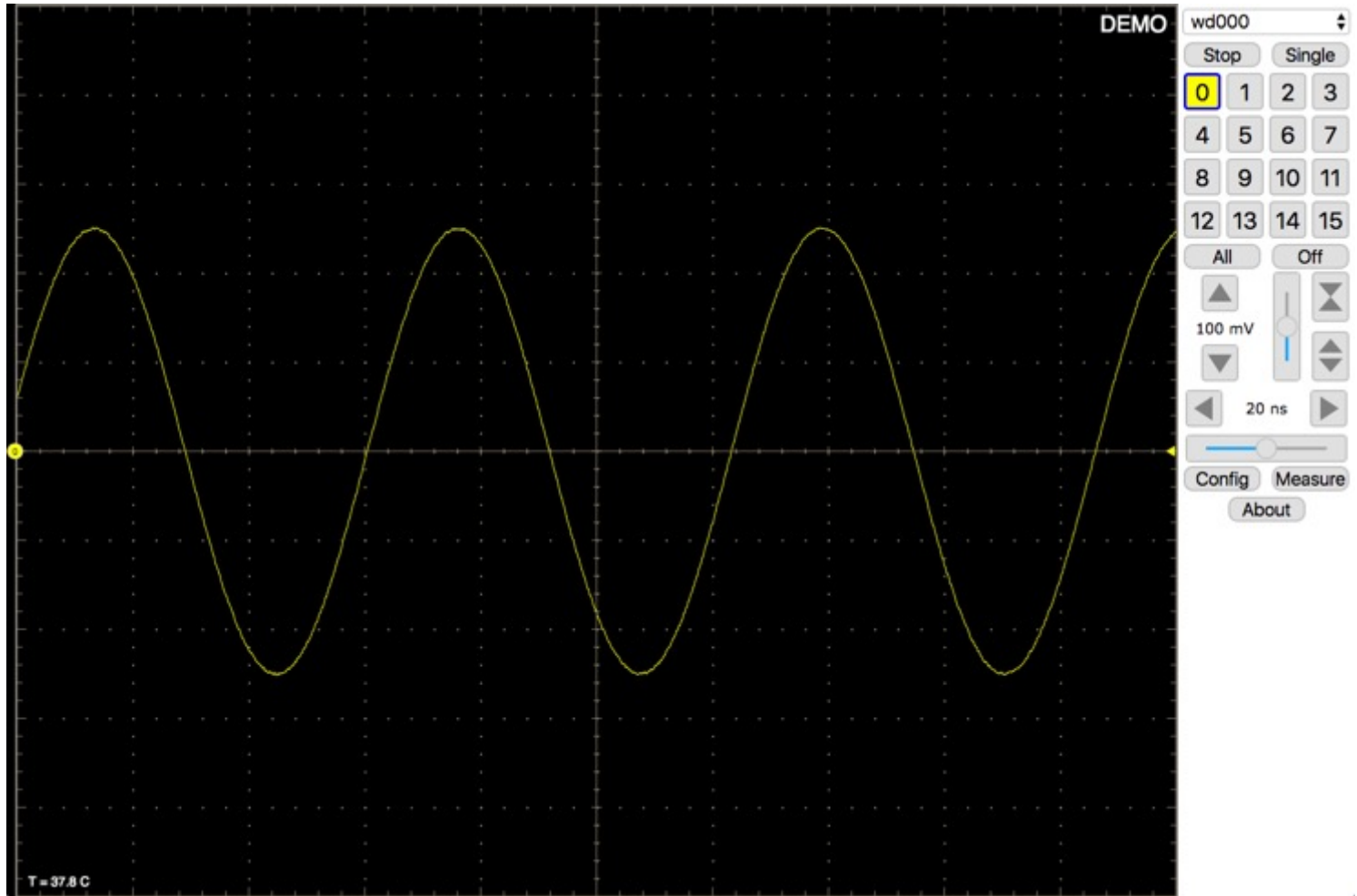
On the right side of the interface, there is a vertical sidebar with a 'Tado' button and a 'Devolo' button. At the bottom right, there are three circular icons: a refresh icon, a home icon, and a plus sign for additional options.

```
<canvas id="myCanvas" width="200" height="100">  
</canvas>
```

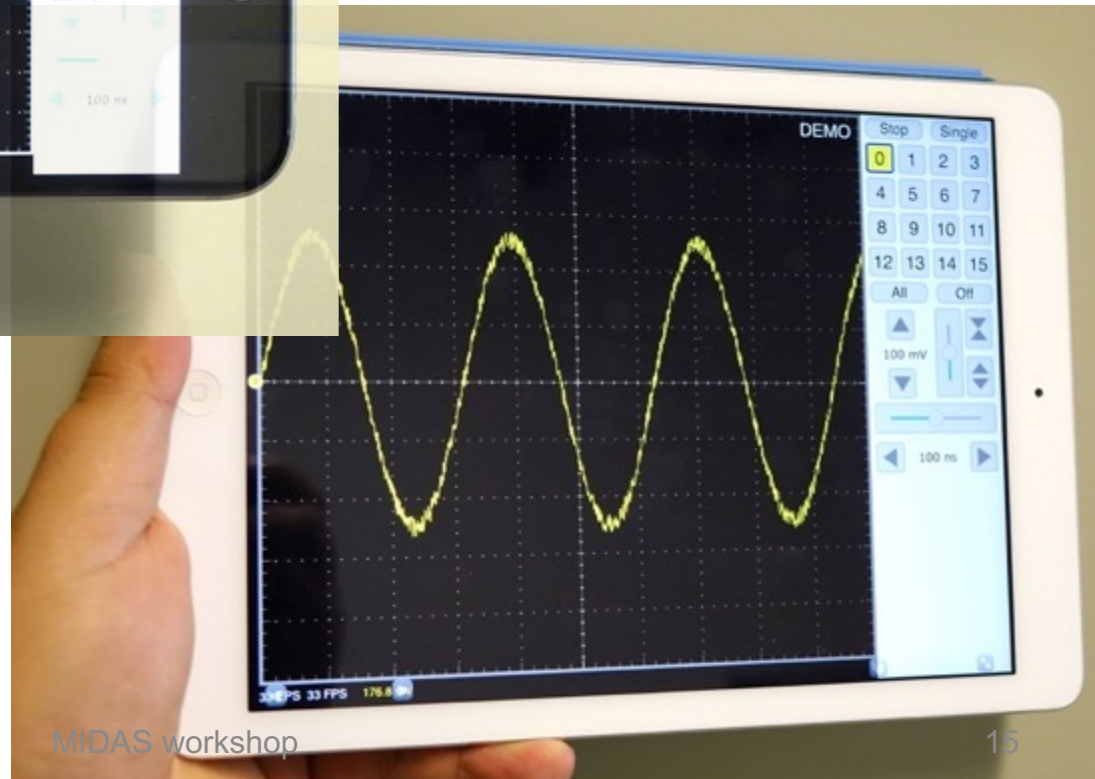
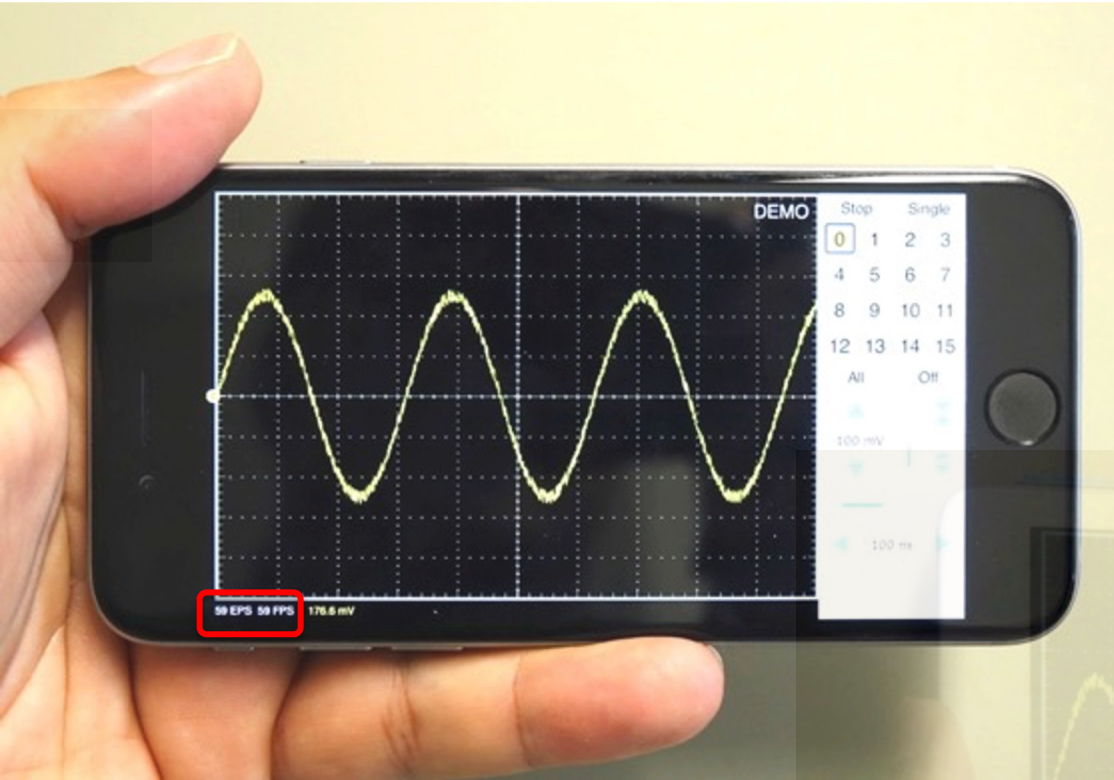
```
var c = document.getElementById("myCanvas");  
var ctx = c.getContext("2d");  
ctx.moveTo(0,0);  
ctx.lineTo(200,100);  
ctx.stroke();
```



- Drawing in a canvas with JS is as fast as native (QT) applications a few years ago
- Drawing library quite complete (alpha, transformations, 3D, ...)
- Development directly in browser, no compilation
- Runs on all OS including smart devices
- This is the future!



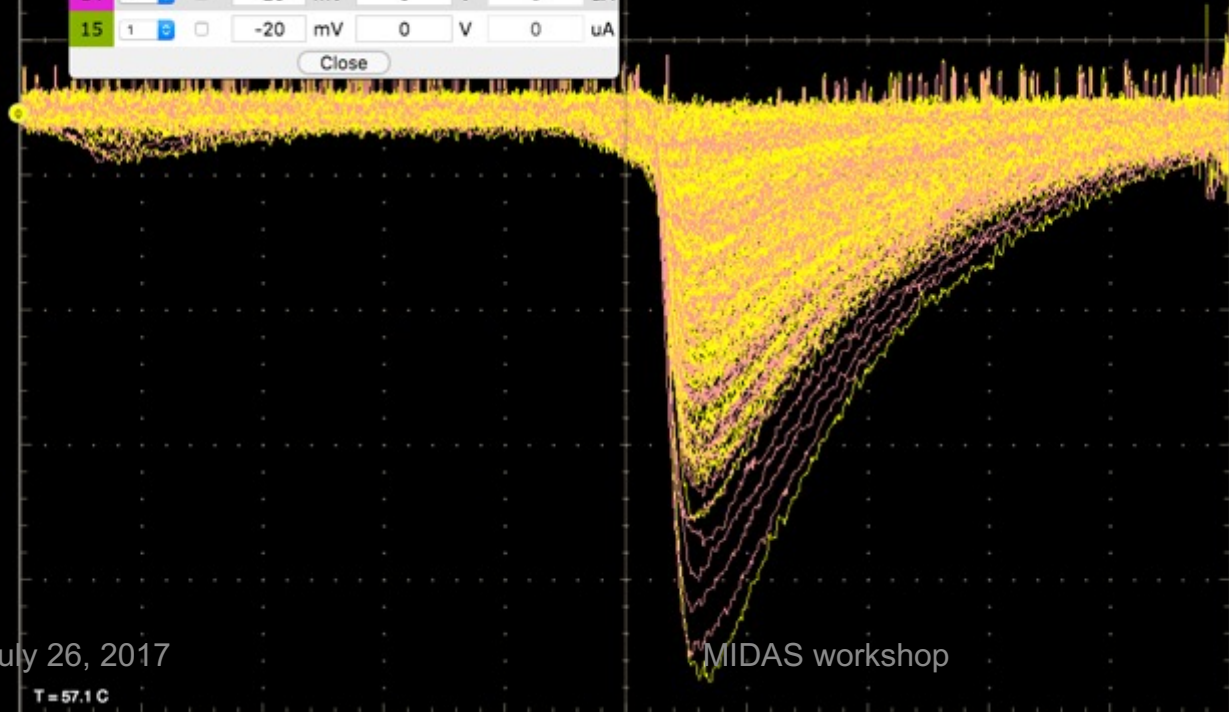
# Display on mobile devices



0 118 Hz  
 1 0 Hz  
 2 118 Hz  
 3 0 Hz  
 4 0 Hz  
 5 0 Hz  
 6 0 Hz  
 7 0 Hz  
 8 0 Hz  
 9 0 Hz  
 10 0 Hz  
 11 0 Hz  
 12 0 Hz  
 13 0 Hz  
 14 0 Hz  
 15 0 Hz  
 T 126 Hz  
 E 100.000 MHz

Channel Configuration						
Chn	Gain	PZC	Trigger Level	HV	Current	
0	1	<input type="checkbox"/>	-20 mV	67 V	0.935 uA	
1	1	<input type="checkbox"/>	-20 mV	0 V	0 uA	
2	1	<input type="checkbox"/>	-20 mV	67 V	0.952 uA	
3	1	<input type="checkbox"/>	-20 mV	0 V	0 uA	
4	1	<input type="checkbox"/>	-20 mV	0 V	0 uA	
5	1	<input type="checkbox"/>	-20 mV	0 V	0 uA	
6	1	<input type="checkbox"/>	-20 mV	0 V	0 uA	
7	1	<input type="checkbox"/>	-20 mV	0 V	0 uA	
8	1	<input type="checkbox"/>	-20 mV	0 V	0 uA	
9	1	<input type="checkbox"/>	-20 mV	0 V	0 uA	
10	1	<input type="checkbox"/>	-20 mV	0 V	0 uA	
11	1	<input type="checkbox"/>	-20 mV	0 V	0 uA	
12	1	<input type="checkbox"/>	-20 mV	0 V	0 uA	
13	1	<input type="checkbox"/>	-20 mV	0 V	0 uA	
14	1	<input type="checkbox"/>	-20 mV	0 V	0 uA	
15	1	<input type="checkbox"/>	-20 mV	0 V	0 uA	

Close



wd096

Stop Single

0 1 2 3

4 5 6 7

8 9 10 11

12 13 14 15

All Off

50 mV

20 ns

Config Measure

Channels Save

About

General

Apply changes to all boards

Trigger

Delay: -20 mV

63 ns

Type:  normal  auto

Source:  int  ext

Analog Front-end

Gain: 1 PZC  PZC 1

Mode:  DRS  ADC

Input range: -0.5 V ... -0.5 V

Enable calibration clock

Connect inputs to calib. source

Power calib. source

DC: 0 mV

Sampling Speed

5.1 GSPS Actual: 5.12 GSPS

Display

Waveform persistency: 2 s

Show hardware scalars

Clock Channels

Clock channels: 16 17

Input: Off

Voltage Calibration

Apply Cell Calibration

Apply Readout Calibration

Apply Gain Calibration

Correct Range Offset

Remove Spikes

Execute Voltage Calibration

Timing Calibration

Rotate waveform relative to trigger

Apply timing calibration

Apply timing offset correction

Correct horizontal trigger position

Use internal reference clock

Execute Time Calibration

16

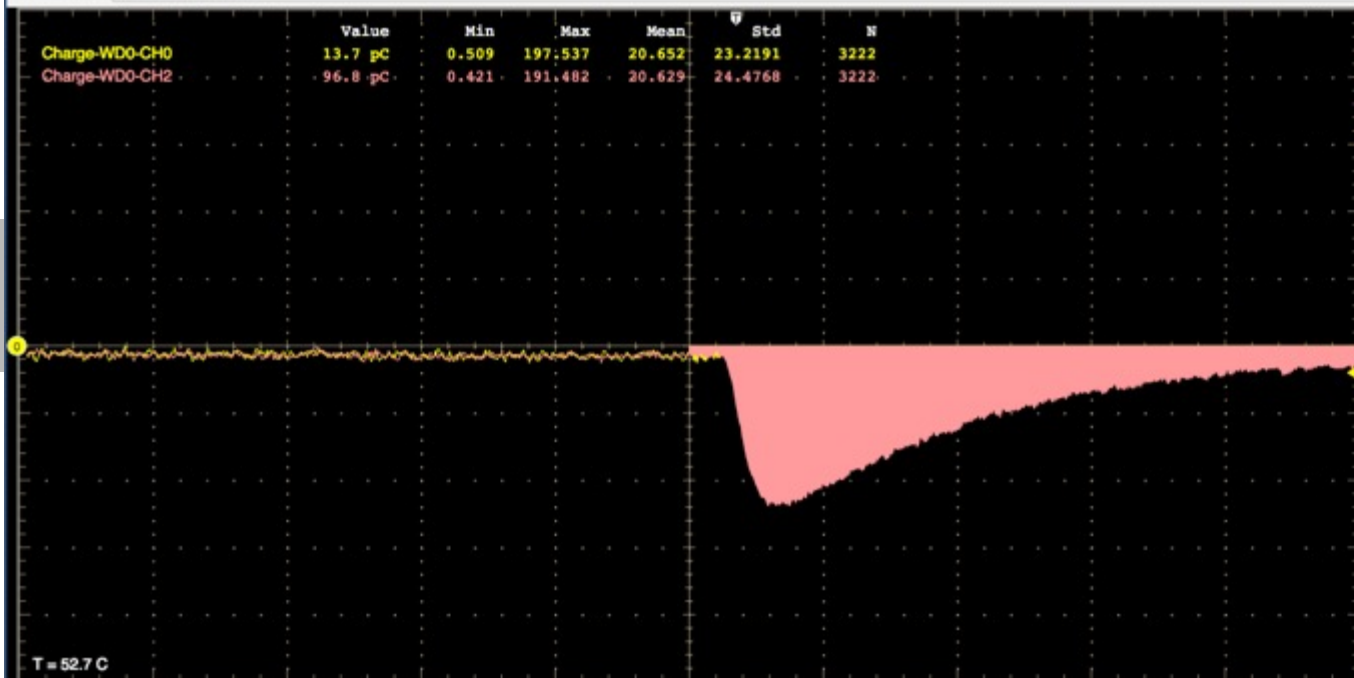
July 26, 2017

MIDAS workshop

T = 57.1 C



	Value	Min	Max	Mean	Std	N
Charge-WD0-CH0	13.7 pC	0.509	197.537	20.652	23.2191	3222
Charge-WD0-CH2	-96.8 pC	0.421	191.482	20.629	24.4768	3222



Mean	Std	N	UPlow	OPlow
9.158	5.3918	2350	1	871
8.929	5.5513	2384	1	837

Measure

Display Histograms

Accumulate 10000 measurements

Clear statistics

Charge wd096 CH0 Time1: 100 Time2: 200

Charge wd096 CH2 Time1: 100 Time2: 200

Close

wd096

Start Single

0 1 2 3

4 5 6 7

8 9 10 11

12 13 14 15

All Off

50 mV

20 ns

Config Measure

Channels Save

About

General

Apply changes to all boards

Trigger

-20 mV

Delay: 63 ns

Type: normal auto

Source: int ext

Analog Front-end

Gain: 1 PZC 1

Mode: DRS ADC

Input range: -0.5 V ... +0.5 V

Enable calibration clock

Connect inputs to calib. source

Power calib. source

DC: 0 mV

Sampling Speed

5.1 GSPS Actual: 5.12 GSPS

Display

Waveform persistency: None

Show hardware scalars

Clock Channels

Clock channels: 16 17

Input: Off

Voltage Calibration

Apply Cell Calibration

Apply Readout Calibration

Apply Gain Calibration

Correct Range Offset

Remove Spikes

Execute Voltage Calibration

Timing Calibration

Rotate waveform relative to trigger

Apply timing calibration

Apply timing offset correction

Correct horizontal trigger position

Use internal reference clock

Execute Time Calibration

The screenshot shows the JSROOT website interface. At the top, there are browser tabs for 'JavaScript ROOT', 'Online server', 'mybinder.org/repo/cernphs...', 'BREIT: Balance Rate Equations', and 'BREIT-CORE/data/input at m...'. The address bar shows 'Secure https://root.cern.ch/js/'.

The main content area is titled 'JSROOT' and includes a navigation menu on the left with sections: 'Examples, APIs', 'Use:', 'Download:', 'Read:', and 'Visit:'. Below these are links for 'User guide', 'Change log', 'THttpServer', 'S.Liev', and 'B.Bellenot'.

The central 'Examples' section displays a grid of 20 small thumbnail images showing various data visualizations: histograms, 2D and 3D plots, maps, and particle detector cross-sections.

At the bottom, the 'Applications' section shows two screenshots of software interfaces and the CERNBox logo.

- Moving MIDAS to JavaScript web pages offers huge opportunities in experiment specific customization
  - Page update without complete reload
  - Modify standard pages
- Combine ODB values, gauges, history plots, ... in one page
- Add other web technologies in **same** page
  - CouchDB database integration for experiment configuration
  - Histograms and analyzer plots through JSROOT
  - (Direct link to devices with JSON interface)

The screenshot shows a web browser window titled "Read a ROOT file" with the URL <https://root.cern.ch/jjs/latest/?nobrowser&file=../files/histpainter6.root&item=dra...>. The browser shows two histograms and a control panel.

**Stacked 1D histograms (Left):** A plot showing three stacked histograms in red, blue, and green. The x-axis ranges from -4 to 4, and the y-axis ranges from 0 to 1400. The histograms are centered at 0.

**Stacked 1D histograms (Right):** A plot showing three stacked histograms in red, blue, and green. The x-axis ranges from -4 to 4, and the y-axis ranges from 0 to 700. The histograms are centered at 0.

**Control Panel (Bottom Left):** A waveform display showing a sine wave. The y-axis is labeled "100 mV" and the x-axis is labeled "20 ns". The display is titled "DEMO" and "w1000".

**Run Status (Bottom Right):** A panel showing the status of the experiment. It includes a "Run Status" section with a "Run 5 Stopped" indicator, "Start: Mon Jul 17 15:53:12 2017", "Stop: Mon Jul 17 15:53:23 2017", and "Experiment Name: online". Below this is a "Logging Channels" table.

Channel	Events	MIB written	Compr.	Disk Level
PSI-run00018.msd	34683	1.875	98.9%	81.9%

Below the logging channels is a "Clients" section with "OOBEdit [localhost]" and "mhttpd [localhost]".