Morfeas WEB
Reference Guide

1   License

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2   Change History

Feb 4,12020 : Sam Harry Tzavaras – Initial Work.

Contents

3   Introduction

The Morfeas WEB is a subproject of the Morfeas Project. It's made to provide a layman friendly web interface, that with the collaboration of Morfeas core components provide an easy to use interface. The Morfeas WEB is constructed by two main parts. This are script that run on the server side and web triptych (HTML, CSS, ECMA-script) files that loaded and run at client. The WEB server that chosen to is the Apache 2 with additional PHP support. The client side can use any modern WEB browser to get access at the parts of the Morfeas WEB.

4   Installation

For compilation and usage of this project the following dependencies required.
* [Morfeas_core] - The core of the Morfeas project.
* [Apache2] - The Apache WEB server.
* [PHP] - The PHP scripting language.
* [libapache2-mod-php] - The PHP module for the Apache 2 webserver.
* [php-dev] - Collection of Headers and other PHP needed for compiling additional modules.
* [php-xml] - A class written in php to create, edit, modify and read XML documents.
* [php-mbstring] - PHP module for manipulation of Multibyte String (UNICODE, etc).

   The compilation and installation procedure for the dependencies and submodules is described at the README.md file that located at the root of the source.

   The "Morfeas_WEB" directory that is located under the root contains all the files of the project, and can be used as it is as source of the Apache. At directory "apache_site_conf" can be found a template for the Apache configuration of the Morfeas WEB page. Also the Morfeas WEB need to have root access in some programs, this done by the "Morfeas_web_allow" file that is located under the sudoers directory. This is done by copy this file at the "/etc/sudoers.d" directory.

   The Morfeas WEB need to have read access at the configuration files of the Morfeas Core an to know where they are located. The information of the location givven to the Morfeas WEB by the "Morfeas_env.php" file, this need to be constructed and initialized by the user, the "Morfeas_env.php.template" can be use for this.

The configuration files of the Morfeas Core need to be configured with write access to the group users and also the "www-data" user to be in the group of the local user where run the Morfeas System.

The Morfeas WEB expect to find the following files at the Morfeas Core's configuration directory:

- Morfeas.dtd - The validation standard file.

- Morfeas_config.xml - Configuration file for the Morfeas System.

- OPC_UA_Config.xml - Morfeas_opc_ua ISO channels object's configuration file.

- ISOstandard.xml - File that contains standards for ISO channels.

Also the exported Logstat files of the Morfeas Core has to be located in a tempfs mounted under "/mnt/ramdisk".

5   Architecture

The Morfeas WEB is architect as a classic server-client system that using HTTP messages for comunication. Specifically the Morfeas WEB initialize "GET" and "POST" requests for the transfer of the pages and data, the transmission of the WEB pages to client handled by the Apache server and the data by the Morfeas WEB PHP scripts. All the transactions done by HTTP requests with compressed contents. Every "GET" request compressed by the GNU ZIP algorithm and "POST" by the internally implemented compress algorithm.

6   Server Side

At the server side the Morfeas WEB have some PHP scripts that handle requests from the client. This scripts runs via the PHP engine that executed as module of the Apache WEB server. The PHP scripts located under the "Morfeas_php" directory.

At the following subsections the operation for etch file will be explained.

6.1   Morfeas_Web_if.php

The PHP script file Morfeas_Web_if.php contains the functionality to provide the Logstat files at the client request and to receive ISO Channels configuration objects. The script can be called as "./morfeas_php/Morfeas_Web_if.php" and accept "GET" and "POST" requests.

6.1.1   GET request

In every call with "GET"" request the Morfeas_Web_if.php script expecting an argument "COMMAND" with value the one of the allowed commands. At the table 1 will present the allowed commands for the Morfeas_Web_if.php script.

Command	Description	Content type
logstats	Return all logstat combined	JSON
logstats_names	Return the filenames of the available logstat	JSON
loggers	Return the filenames of the logger (Morfeas component)	JSON
opcua_config	Return the current ISO Channel configuration	JSON

Table 1: GET request values for argument "COMMAND"

In case that an invalid value sent to the script, the response will be a question mark "?". If the calling made without the argument "COMMAND" then the return will be "HTTP ERROR 404".

6.1.2   POST request

The "Morfeas_Web_if.php" script is also accept a "POST" request in order to accept new configuration for the ISO Channel of the OPC-UA. The contents for this kind of request is a JSON object with tag name "data" and contain an array with the configuration for each ISO Channel. Every position of the array contains a JSON object with the configuration for each of the ISO channel. The structure for the argument of the POST request presented at listing 1.

Listing 1: Example for argument of POST request for Morfeas_Web_if.php

```
{"data":
  [
   {
      "ISOChannel":"Name of the ISO Channel",
      "IF_type":"MDAQ"|"SDAQ"|"IOBOX"|"MTI",
      "Anchor":"The anchored physical input with the current ISO Channel",
      "Description":"Description of the ISO Channel",
      "Max":"Minimum input value",
      "Min":"maximum input value",
      "Unit":"Unit of measurements (Not needed for SDAQ IF_type)"
   },
    ...
  ]
}
```

In every success the "Morfeas_Web_if.php" return a JSON object with a report, otherwise return a string with the error that cause it to fail.

6.2   config.php

The "config.php" is a PHP script part of the Morfeas WEB where is responsible for each configuration of the computer and the Morfeas System. It's can called from "./morfeas_php/config.php", and accept "GET" and "POST" HTTP requests. At the following subsection the functionality and data the can be exchange via this script will be explained in details.

6.2.1   GET request

For accept a "GET" request the "config.php" is required to received the request with the argument "COMMAND" that have a specific value that explain the request that the client want. At the table 2 derived a list with the allowed values and descriptions for the functionality of each one.

Command	Description	Content type
getbundle	Return a .mbl file with wholly Morfeas System configuration	File
getISOstandard_file	Make a force download of current ISOStandard file	File
getCurConfig	Return the current Internet and NTP configuration	JSON
timedatectl	Return the output of timedatectl	HTML
getMorfeasConfig	Return the current Morfeas system configuration	XML
getISOstandard	Return an instance of the current ISOStandard file	XML
getCANifs_names	Return the available CANBus interfaces	JSON

Table 2: GET request values for argument "COMMAND"

In case that the value of argument "COMMAND" is not valid or if the argument is missing the script will return "HTTP ERROR 404".

6.2.2   POST request

The "config.php" script accept also POST HTTP requests that caries out configurations for the computer and the Morfeas System. The script steering the functionality according to the "CONTENT_TYPE" of the HTTP message that the client sent to the server. The data that contained in the POST request message must be compressed with the internally implemented "compress" function. At table 3 will be present all the allowed set values for the "CONTENT_TYPE" of a POST request.

Content type	Description	Contents Data
net_conf	Request with new config for Hostname, INET, CAN, NTP	JSON
Morfeas_config	Request with new configuration for Morfeas system	XML
ISOstandard	Request with new ISOStandard	XML
Morfeas_bundle***	Request with a restoring bundle file	MBL
reboot	Request for computer reboot	VOID
shutdown	Request for computer power off	VOID

Table 3: Content types for POST request

*** Post request with "Morfeas_bundle" as Content type does not required any compression on data.

The contain structure of a "net_config" type request present at listing 2.

Listing 2: Structure of contents for POST request with "contents_type:net_config"

```
{
  "hostname":"Computer's Hostname",
  "mode":"DHCP"|"Static",//Internet configuration
  "ip":###,"mask":#,"gate":###, <- Used if mode == "Static"
  "ntp":###,//IPv4 of NTP server
  "CAN_ifs"://Only if CANBus adapters are available
    [
      {
        "if_Name":"Name of CANBus interface",
        "bitrate":#//In bits per second
      },
      ....
    ]
}
```

***The variables that present settings that will not be configured can be excluded from the object.
#Every variable that representing IPv4 stored as integer number that present the 32 bit's of the IPv4 address in big-endian form.
eg. The IPv4 **"100.45.78.10"** will represent by $(\mathbf{1680690698})_\mathbf{d}$.

The data contents of a POST request with with contents_type:"Morfeas_config" is send in XML format that follow the standard of the Morfeas System. More information for this at reference guide of the Morfeas Core project.

The data contents of a POST request with with contents_type:"ISOstandard" is also send in XML format, an example of the structure for this derived at listing 3.
Every child node of node "points" is present an ISOStandard, then name tag of each is the name that will used as ISOChannel. The children of every ISOStandard must be four in total with tags **description, unit, max, min** in this order. The content of every child represent each name tag.

Listing 3: Structure of contents for POST request with "contents_type:ISOstandard"

```
<?xml version="1.0" encoding="UTF-8"?>
<root>
  <points>
    <ISOStandard_name_tag>
      <description>Description of ISOStandard</description>
      <unit>Default Unit</unit>
      <max>Maximum value</max>
      <min>Minumum value</min>
    </ISOStandard_name_tag>
    ....
  </points>
</root>
```

Post request with contents_type:Morfeas_bundle used to upload and reconfigure the Morfeas System and the ISOChannel of the Morfeas OPC-UA server on a previous state. The contents of this request type is a binary .mbl file. Also this request does not required any compression of the contents.

The last two request "reboot" and "shutdown" used in order to reboot and shutdown the computer respectively.

The return of the script in success will be a JSON report for "net_conf" and "Morfeas_config" contents_type and a human readable string for "ISOstandard", "Morfeas_bundle". In case of failure the script will answer with a human readable string with the error that cause it to fail, or with an "HTML ERROR 404" in case that the contents_type is unknown.

6.3 Morfeas_dbus_proxy.php

The Morfeas_dbus_proxy.php is a PHP script part of the Morfeas WEB project that made to act as a proxy between the WEB and the Morfeas components that have D-BUS functionality. THis script can be called from "./morfeas_php/Morfeas_dbus_proxy.php" and accepting only POST requests. The POST request which is send to this script must contain an argument "arg" with value a JSON object (example 4) that will give to the script the information of to which Morfeas component the data will go, the type of the device that will be handled, the D-BUS method that will be called and the contents of the D-BUS message.

Listing 4: Structure of contents for POST request for Morfeas_dbus_proxy.php

```
{
  "handler_type":"Morfeas Handler component",
  "dev_name":"Device name",
  "method":"D–BUS method",
  "contents":{"Object with the data that will send to handler"}
}
```