

Module main

NOTED: a framework to optimise network traffic via the analysis of data from File Transfer Services.

Authors:

- * Carmen Misa Moreira
- * Edoardo Martelli

Company:

CERN (IT-CS-NE)

\$ python3 main.py config-example.py [--verbosity debug/info/warning]

python3 main.py -h

usage: main.py [-h] [--v VERBOSITY] config_file

NOTED: a framework to optimise network traffic via the analysis of data from File Transfer Services

positional arguments:

config_file

the name of the configuration file [config-example.yaml]

optional arguments:

-h, --help

show this help message and exit

--v VERBOSITY, --verbosity VERBOSITY

defines the logging level [debug, info, warning]

Structure of the project:

.

├── TransferBroker.py

├── __init__.py

├── config

│ └── config-example.yaml

├── documentation

│ ├── noted_main_function_documentation.pdf

│ └── noted_transfer_broker_class_documentation.pdf

├── html

│ ├── TransferBroker.html

│ └── main.html

├── log

│ ├── sense.log

│ └── transfer_broker.log

├── main.py

├── noted_email.txt

├── params

│ └── params.ini

├── plot_transfers.py

├── query

│ ├── query_monit_prod_fts_raw_queue_dst_rcsite

│ ├── query_monit_prod_fts_raw_queue_src_rcsite

├── sense-o

│ ├── sense-cancel.sh

│ └── sense-provision.sh

├── transfers

│ ├── transfer_broker_all_transfers.txt

│ ├── transfer_broker_dst_rcsite.txt

│ └── transfer_broker_src_rcsite.txt

EXPAND SOURCE CODE

Functions

def append_data_to_log_file(filename, df_last_event)

Function to append data to a log file.

Args

filename : str

name of the file to append data.

df_last_event : dataframe

last FTS optimizer event.

EXPAND SOURCE CODE

def build_thread(params, type)

Function to create a thread per link for monitoring the transfers.

Args

params : configparser

parameters file.

type : str

direction of the link, it can take two values: {tx, rx}.

Returns

thread

pointing to a defined link.

EXPAND SOURCE CODE

def generate_query(config, params, type, df_cric_database)

Function to generate the queries for downloading the FTS raw queues.

Args

config : dict

dictionary with the yaml configuration file.

params : configparser

parameters file.

type : str

direction of the link. It can take two values: src_rcsite or dst_rcsite.

df_cric_database : DataFrame

CRIC database information in a dataframe structure.

Returns

list

list of endpoints for a defined link.

EXPAND SOURCE CODE

def get_endpoints_rcsites(df_cric_database, df_cric_endpoints)

Function to get endpoints and rcsites.

Args

df_cric_database : dataframe

CRIC database.

df_cric_endpoints : dataframe

CRIC endpoints.

Returns

dataframe

columns Rcsite, Federation and Endpoint of CRIC database in a dataframe structure.

EXPAND SOURCE CODE

def get_fts_optimizer_events(cmd)

Function to get the FTS optimizer events.

Args

cmd : str

curl command to execute.

Returns

dataframe

FTS optimizers events in a dataframe structure.

EXPAND SOURCE CODE

def get_metrics_link(df_last_event)

Function to get the metrics of the link.

Args

df_last_event : dataframe

last event of FTS optimizer.

Returns

float64

amount of data in GB.

float64

throughput of the link in Gb/s.

int64

number of TCP parallel transfers.

int64

number of transfers in the queue.

int64

timestamp of the current FTS optimizer event.

EXPAND SOURCE CODE

def get_rcsites_ip_address(df_cric_database, df_query, ip_version)

Function to get IPv4/IPv6 addresses, fills the columns 'IPv4' and 'IPv6' of df_cric_database.

Args

df_cric_database : dataframe

CRIC database.

df_query : dataframe

FTS optimizer events.

ip_version : str

IP version, it can take two values: {ipv4, ipv6}.

EXPAND SOURCE CODE

def get_rcsites_ip_addresses(df_cric_database, df_cric_ip_address)

Function to get rcsites and IPv4/IPv6 addresses.

Args

df_cric_database : dataframe

CRIC database.

df_cric_ip_address : dataframe

CRIC IPv4/IPv6 addresses.

Returns

dataframe

columns 'IPv4' and 'IPv6' of CRIC database in a dataframe structure.

EXPAND SOURCE CODE

def get_subendpoints_rcsites(df_sub_endpoint)

Function to get sub-endpoints in rcsites.

Args

df_sub_endpoint : dataframe

CRIC database sub-endpoints.

Returns

list

endpoints of rc_site in a list structure.

EXPAND SOURCE CODE

def inspect_transfers(params)

Function to inspect transfers parameters in FTS.

Args

params : configparser

parameters file.

Returns

dataframe

last event of FTS optimizer.

EXPAND SOURCE CODE

def load_json_from_url(json_url)

Function to load a json file from URL.

Args

json_url : str

url of the json file.

Returns

dict

data in a dictionary structure.

EXPAND SOURCE CODE

def load_yaml(filename)

Function to load a yaml file.

Args

filename : str

name of the yaml file.

Returns

dict

data in a dictionary structure.

EXPAND SOURCE CODE

def main()

Main function.

EXPAND SOURCE CODE

def make_decision_before_alert(params, action, message)

Function to make a decision on the link for looking into the FTS queue before alert.

Args

params : configparser

parameters file.

action : str

action to be execute on the link, it can take two values: {start, stop}

message : str

message to send in the email notification

EXPAND SOURCE CODE

def make_decision_link(params, df_last_event)

Function to make a decision on the link [start/stop events].

Args

params : configparser

parameters file.

df_last_event : dataframe

last event of FTS optimizer.

EXPAND SOURCE CODE

def monitor_queue_before_alert(params, action)

Function to monitor FTS queue for X events to check if it is just instantaneous traffic or a huge transfer is going to take place.

Args

params : configparser

parameters file.

action : str

action to execute, it can take two values {start, stop}.

EXPAND SOURCE CODE

def monitor_transfers(params)

Function to monitor transfers in FTS, this function is used by TX/RX threads.

Args

params : configparser

parameters file.

EXPAND SOURCE CODE

def query_cric_database(params)

Query CRIC database.

Args

params : configparser

parameters file.

Returns

dataframe

CRIC database information in a dataframe structure.

EXPAND SOURCE CODE

def send_email(params, message)

Function to send an email for advertising the congestion of the link.

Args

params : configparser

parameters file.

message : str

message to stream

EXPAND SOURCE CODE

def sense_dynamic_circuit(params, task, action, message)

Function to provide or cancel a dynamic circuit by using sense-o autogole northbound API.

Args

params : configparser

parameters file.

task : str

action to be executed in sense-o, it can take two values: {provision, cancel}.

action : str

action to be execute on the link, it can take two values: {start, stop}

message : str

message to send in the email notification

EXPAND SOURCE CODE

def start_threads(transfers_tx, transfers_rx)

Function to start thread and monitor the transfers.

Args

transfers_tx : thread

tx thread.

transfers_rx : thread

rx thread.

EXPAND SOURCE CODE

Index

NOTED: a framework to optimise network traffic via the analysis of data from File Transfer Services.

Functions

append_data_to_log_file
build_thread
generate_query
get_endpoints_rcsites
get_fts_optimizer_events
get_metrics_link
get_rcsites_ip_address
get_rcsites_ip_addresses
get_subendpoints_rcsites
inspect_transfers
load_json_from_url
load_yaml
main
make_decision_before_alert
make_decision_link
monitor_queue_before_alert
monitor_transfers
query_cric_database
send_email
sense_dynamic_circuit
start_threads