HOMER #SEVEN
WE ARE QXIP BV, AMSTERDAM
MISSION CAPTURE YOUR RTC HEARTS WITH HOMER
OSS FAMILY ALEXANDR DUBOVIKOV (CTO, FOUNDER), LORENZO MANGANI (CEO), CELESTE (CFO), DARIO (TPM), FEDERICO CABIDDU, GIACOMO VACCA, EUGEN BIEGLER, MICHELE CAMPUS, GAETANO GARGIULO, OPENSIPS TEAM, KAMAILIO TEAM, ASTERISK TEAM, FREESWITCH, JANUS MEETECHO, MEDIASOUP AMIGOS & ALL OUR FRIENDS
HOMER IS ALIVE!
HOMER IS ALIVE!

The next HOMER has been long overdue!

We aimed really, really, really high in terms of features and design requirements.
We’re a very small group, struggling to maintain old and create new versions.
We are self-sponsored FOSS (more on this later).
what is...

HOMER
A Centralized Packet Capture System to Index and Troubleshoot VoIP and RTC Traffic

Natively supported by awesome projects such as OpenSIPS, Kamailio, Asterisk, Freeswitch, Janus

Alive and Kicking since 2011 (applause for surviving if you know how hard it gets for small fish)
what is...

HOMER

SEVEN?

SIX WAS A DEVELOPMENT VERSION

“We are products of our past, but we don’t have to be prisoners of it.”
<table>
<thead>
<tr>
<th>HOMER 5.x</th>
<th>HOMER 7.x</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Stale Project &amp; Codebase</td>
<td>● Clean, Extended Project Ecosystem</td>
</tr>
<tr>
<td>● Complex Installation Steps</td>
<td>● <strong>Simplified Installation</strong> &amp; Less Moving Parts</td>
</tr>
<tr>
<td>● Monolithic Configuration</td>
<td>● Switch to <strong>Modular Configuration</strong></td>
</tr>
<tr>
<td>● Agents too complex to configure</td>
<td>● <strong>More Agents</strong>, More Options for Everyone</td>
</tr>
<tr>
<td>● Steep entrypoint for Developers</td>
<td>● Clean, Standardized, Documented Code</td>
</tr>
<tr>
<td>● Too Few Protocols</td>
<td>● <strong>Protocol Agnostic</strong> at the Core/DBs</td>
</tr>
<tr>
<td>● Too Basic Statistics</td>
<td>● Customizable <strong>Metrics Exporters</strong></td>
</tr>
<tr>
<td>● Static Correlation</td>
<td>● <strong>Distributed Correlation</strong> using Graph DBs</td>
</tr>
<tr>
<td>● Minimal RTC Features</td>
<td>● <strong>RTC Ready</strong> <em>(statistics + protocol events)</em></td>
</tr>
<tr>
<td>● Outdated User Interface</td>
<td>● <strong>Redesigned User-Interface</strong> <em>(in development)</em></td>
</tr>
</tbody>
</table>
COOL STORY BRO.

WHAT IS THE AGENDA
AMBITIOUS.

THE FULL PICTURE
HOMER SEVEN

YOU?

HOMER UI

KAMAILIO

OPENSIPS

DATABASE

HEP I/O TOOLS

HEP AGENTS

EXTERNAL DBs

TIME SERIES

ALERTS

HOMER CORE

HOMER METRIC

YOU?

HOMER UI

KAMAILIO

OPENSIPS

DATABASE

HEP I/O TOOLS

HEP AGENTS

EXTERNAL DBs

TIME SERIES

ALERTS

HOMER #SEVEN
**MISSION**
CAPTURE, MAP, INDEX, CORRELATE AND SEARCH

**HOMER CORE** is the new fulcrum of the Project

**NEW API:**
Developed in Node JS from the ground up, following the best standards for stability and extensibility. *Bye PHP!*

**NEW DB SCHEMA:**
Fully leveraging the latest JSON datatype features in MySQL 5.7 and 8+ to provide a powerful and flexible storage to the HOMER and HEP ecosystem

**NEW HEP TYPES:**
OpenSIPS 2.3+ and Kamailio 5+ both provide great features enhancing and extending the monitoring and capture capabilities of HOMER
**HOMER SEVEN**

**HOMER METRIC** is the Statistics Shop of the stack

**SMART:**
We’re not reinventing the wheel - there are many projects out there providing great Time Series monitoring and Alerting, and the smart choice is always to integrate.

**FLEXIBLE:**
There’s no one stop shop for anything nowadays. HOMER allows you to use multiple export backends in parallel.

**EXTENSIBLE:**
Every available feature and module are an opportunity. Fancy something custom? Pipe everything to paStash and define your own logic using Node JS and NPM modules.

**MISSION**
EXPORT AND FORK METRICS TO MULTIPLE EXTERNAL TARGETS
INGRESS HEP AGENTS
Your classic HEP Agents, enhanced with the latest features and protocol Types

CaptAgent
- SIP,TLS,RTCP,Diameter

HEPlify
- SIP,RTCP,DNS

HoracliFix - HepFix
- Oracle SIP,RTCP,RTC

OpenSIPS
- SIP,REST,MI,LOGS

paStash
- CDRs,File,Websocket,Net
- Janus RTC Events
- MediaSoup Events
- Freeswitch ESL
- Asterisk AMI

.. and more!

MISSION
IMPORT, EXPORT AND FORK HEP STACK DATA

EGRESS HEP AGENTS
Agents interfacing with the rest of the data world, allowing parallel export and manipulation of data and statistics

PaStash
- Elasticsearch
- Splunk
- Statsd
- Redis
- Kafka
- GunDB
- ZeroMQ
- MQTT
- AMQP
- NSQ
- HEP
- HTTP/S

... and more!
The **key** feature of our next-generation platforms will be the ability to grow the supported stack quickly and being able to define and add **new protocols** and **event types** expressed and transported by a generic or dedicated **HEP subtypes**.

The design allows automatically mapping received protocols to schemas using self-determined matching or user defined configuration for granular control over data indexing strategy and cross-correlation for extracted protocol field elements.

*All new protocols will be first-class citizen and feature full search, visualization and correlation features the stack offers.*

*The new HEP sources include HEPlify, OpenSIPS 2.3+ (SIP, REST, MI, LOGS) Janus Gateway, Mediasoup and others!*
SOUNDS COMPLEX?

A LOOK UNDER THE HOOD
HEP JSON

HEP Agent

Proto Dissector

JSON payload

HEP Type

JSON Schema

HOMER UI

Search Query

HOMER API

MySQL 8.x

JSON Index

JSON Insert

Rotation & Partitioning

Schema Check

Schema Creation

{ 
  gid: {HEP_GID},
  create_date: {HEP_TS},
  hep_header: {HEP_HDR},
  protocol_header: {PROTO_X_HEADER},
  payload: {PROTO_X_JSON_PAYLOAD},
  raw: {PROTO_X_RAW_DATA}
}
HEP JSON

HEP JSON : DNS Packet

#
U 127.0.0.1:48304 -> 127.0.0.1:9060
#
U 127.0.0.1:48304 -> 127.0.0.1:9060
#
U 127.0.0.1:48304 -> 127.0.0.1:9060

DNS Query — heplify — hep — HEP SOCKET
HEP JSON DNS: Table Structure

```
mysql> show create table hep_proto_53_all_20171202\G
*************************** 1. row ***************************
Table: hep_proto_53_all_20171202
Create Table: CREATE TABLE `hep_proto_53_all_20171202` (  
`id` bigint(20) unsigned NOT NULL AUTO_INCREMENT,  
`gid` smallint(5) unsigned NOT NULL DEFAULT '0',  
`create_date` timestamp NOT NULL DEFAULT '1970-01-01 00:00:01',  
`hep_header` json NOT NULL,  
`protocol_header` json NOT NULL,  
`payload` json NOT NULL,  
`raw` varchar(2000) NOT NULL,  
PRIMARY KEY (`id`,'create_date'),  
KEY `create_date` (`create_date`) ) ENGINE=InnoDB AUTO_INCREMENT=90 DEFAULT CHARSET=utf8 ROW_FORMAT=COMPRESSED
```
mysql> select * from hep_proto_53_all_20180203 WHERE JSON_EXTRACT(payload, "$questions[0].name") = "google.com" 

*************************** 1. row ***************************
  id: 89
gid: 10
create_date: 2017-12-02 15:13:06
  hep_header: {"proto": 53, "version": "3", "protocol": "hep", "time_sec": "1512227586", "time_usec": "151992", "timestamp": 1512227586, "capture_id": 102, "capture_ip": "127.0.0.1", "payload_len": 292, "correlation_id": ""}
  protocol_header: {"type": "ip", "vlan": 0, "ip_proto": 17, "protocol": "hep", "ip_family": 3, "source_ip": "172.93.49.177", "source_port": 42557, "destination_ip": "8.8.8.8", "destination_port": 53}
  payload: {"z": 0, "aa": false, "id": 65082, "qr": false, "ra": false, "rd": true, "tc": false, "anc": 0, "arc": 0, "nsc": 0, "qdc": 1, "opcode": 0, "rescode": 0, "questions": [{"name": "google.com", "type": 1, "class": 1}]
  raw: {"data": "{\"id\":65082,\"qr\":false,\"opcode\":0,\"aal\":false,\"tc\":false,\"rd\":true,\"ra\":false,\"z\":0,\"rescode\":0,\"qdc\":1,\"anc\":0,\"arc\":0,\"nsc\":0,\"questions\":[{\"name\":\"google.com\",\"type\":1,\"class\":1}]), \"protocol\": \"json-dns\", \"timestamp\": 1512227586, \"hep_protocol\": 53}
mysql> alter table hep_proto_53_all_20180203 add `host_name` varchar(255) GENERATED ALWAYS AS (json_unquote(json_extract(`payload`,'$.questions[0].name'))) VIRTUAL NOT NULL;

mysql> select * from hep_proto_53_all_20180203 WHERE host_name = "google.com" \G

*************************** 1. row ***************************
    id: 89
     gid: 10
  create_date: 2017-12-02 15:13:06
hep_header: {"proto": 0, "version": "3", "protocol": "hep", "time_sec": "1512227586", "time_usec": "151992", "timestamp": 1512227586, "capture_id": 0, "capture_ip": "127.0.0.1", "payload_len": 292, "correlation_id": ""}
protocol_header: {"type": "ip", "vlan": 0, "ip_proto": 17, "protocol": "hep", "ip_family": 3, "source_ip": "172.93.49.177", "timestamp": 1512227586, "source_port": 42557, "destination_ip": "8.8.8.8", "destination_port": 53}
payload: {"z": 0, "aa": false, "id": 65082, "qr": false, "ra": false, "rd": true, "tc": false, "anc": 0, "arc": 0, "nsc": 0, "qdc": 1, "opcode": 0, "rescode": 0, "questions": [{"name": "google.com", "type": 1, "class": 1}]}
raw: {"data": "{\"id\":65082,\"qr\":false,\"opcode\":0,\"aa\":false,\"tc\":false,\"rd\":true,\"ra\":false,\"z\":0,\"rescode\":0,\"qdc\":1,\"anc\":0,\"nsc\":0,\"arc\":0,\"questions\":[{\"name\":\"google.com\",\"type\":1,\"class\":1}]}\n"protocol": "json-dns", "timestamp": 1512227586, "hep_protocol": 53}
mysql> select * from hep_proto_126_all_20171202 limit 1
  id: 133
  gid: 10
  create_date: 2017-12-02 15:21:15
  hep_header: {"proto": 126, "version": "3", "protocol": "hep", "time_sec": "1512222320", "time_usec": "136075", "timestamp": 1512222320, "capture_id": 0, "capture_ip": "127.0.0.1", "payload_len": 244, "correlation_id": ""
  protocol_header: {"type": "ip", "vlan": 0, "ip_proto": 17, "protocol": "hep", "ip_family": 3, "source_ip": "10.93.49.177", "timestamp": 1512222320, "source_port": 8080, "destination_ip": "10.93.100.1", "destination_port": 8080}
  payload: {"type": 2, "timestamp": 1499105804472212, "session_id": "715597540605813", "handle_id": "8796940787397620", "event": {"name": "attached", "plugin": "janus.plugin.videoroom", "opaque_id": "videoroomtest-MamUvDmUymu84N_"}}

mysql> select * from hep_proto_133_all_20171202 limit 1
  id: 225
  gid: 10
  create_date: 2017-12-02 15:21:15
  hep_header: {"proto": 133, "version": "3", "protocol": "hep", "time_sec": "1512222320", "time_usec": "136075", "timestamp": 1512222320, "capture_id": 0, "capture_ip": "127.0.0.1", "payload_len": 89, "correlation_id": ""
  protocol_header: {"type": "ip", "vlan": 0, "ip_proto": 17, "protocol": "hep", "ip_family": 3, "source_ip": "10.0.0.1", "timestamp": 1512222320, "source_port": 8080, "destination_ip": "10.0.0.2", "destination_port": 8080}
  payload: {"roomId": 19501821, "event": "room.newpeer", "peerName": "5jqagpr3", "timestamp": 1517502063613}
### HEP JSON SIP: Table Structure

```sql
mysql> show create table hep_proto_101_all_20171126\G
*************************** 1. row ***************************
Table: hep_proto_101_all_20171126
Create Table: CREATE TABLE `hep_proto_101_all_20171126` (  
  `id` bigint(20) unsigned NOT NULL AUTO_INCREMENT,
  `gid` smallint(5) unsigned NOT NULL DEFAULT '0',
  `create_date` timestamp NOT NULL DEFAULT '1970-01-01 00:00:01',
  `hep_header` json NOT NULL,
  `protocol_header` json NOT NULL,
  `payload` json NOT NULL,
  `raw` varchar(2000) NOT NULL,
  `callid_virtual` varchar(255) GENERATED ALWAYS AS (json_unquote(json_extract(`payload`,'$.callid'))) VIRTUAL NOT NULL,
PRIMARY KEY (`id`),
KEY `create_date` (`create_date`),
KEY `payload_callid_idx` (`callid_virtual`) ) ENGINE=InnoDB AUTO_INCREMENT=2 DEFAULT CHARSET=utf8 ROW_FORMAT=COMPRESSED /
/*!50100 PARTITION BY RANGE ( UNIX_TIMESTAMP(`create_date`)) 
(PARTITION pmax VALUES LESS THAN MAXVALUE ENGINE = InnoDB) */
```
HEP JSON

JSON SIP : Select Data

```
select * from hep_proto_1_call_20171201 limit 1

*************************** 1. row ***************************
id: 156
 gid: 10
create_date: 2017-12-01 06:27:40
hep_header: {"proto": 1, "version": "4294967295", "protocol": "hep", "time_sec": "1512109660", "time_usec": "187", "timestamp": 1512109660,
"capture_id": 0, "capture_ip": "192.168.1.1", "payload_len": 648, "correlation_id": "}
protocol_header: {"type": "ip", "vlan": 0, "ip_proto": 0, "protocol": "hep", "ip_family": 3, "source_ip": "192.168.1.1", "timestamp": 1512109660,
"source_port": 5060, "destination_ip": "192.168.1.2", "destination_port": 5060}
payload: {"cseq": "1", "ruri": "sip:nodejs@127.0.0.1", "via_1": "SIP/2.0/UDP 127.0.0.1:48495;branch=z9hG4bK9b82aa8fb4c7705466a3456dfff7f384333332", "callid": "jhnzl3x1rg7hx0jmx529@127.0.0.1", "method": "INVITE", "to_user": "nodejs", "from_tag": "2628881569", "protocol": "sip", "from_user": "nodejs", "ruri_user": "nodejs", "timestamp": 1512109660, "to_domain": "127.0.0.1", "user_agent": "HEPGEN-UAC", "callid_aleg": "jhnzl3x1rg7hx0jmx529@127.0.0.1", "from_domain": "127.0.0.1", "ruri_domain": "127.0.0.1", "transaction": "call", "content_type": "application/sdp", "hep_protocol": 1, "via_1_branch": "z9hG4bK9b82aa8fb4c7705466a3456dfff7f384333332"}
callid_virtual: jhnzl3x1rg7hx0jmx529@127.0.0.1
raw: INVITE sip:nodejs@127.0.0.1 SIP/2.0
```

......
AWESOME!

WHAT ABOUT STATISTICS?
HOMER SEVEN ships with a brand new modular configuration style, with every function neatly structured in blocks ready to assemble and combine, providing easy access to understand, extend and customize core logic elements.

From the main homer.cfg users can control:

- Parameters for Homer
- Parameters for HEP Sockets
- Parameters for Data Storage
- Parameters for Elastic, Graylog, InfluxDB
- Function Switches for Time Series
- Custom Functions and Integrations

Docker Container w/ Full Stack: https://github.com/lmangani/homer-metric-all

```c
/* Parameters for InfluxDB */
#!substdef "!INFLUXDB_HTTP_URL!http://192.168.2.1:8086!g"
#!substdef "!INFLUXDB_DB!homer!g"
#!substdef "!INFLUXDB_PRECISION!u!g"
#!substdef "!INFLUXDB_RETENTION!autogen!g"

/* Parameters for the rtimer module sending stats */
#!substdef "!CHECK_STATS_INTERVAL!1!g"

/* Series Selection for emission */
#define DO_ELASTICSEARCH
#define DO_INFLUXDB
#define DO_GRAYLOG
#define DO_GEO
#define DO_ISUP
#define DO_KPI
#define DO_MALICIOUS
#define DO_METHOD
#define DO_RESPONSE
#define DO_RTCPXR
#define DO_USERAGENT
#define DO_XHTTP
#define DO.XRTP
```
InfluxDB

InfluxDB is a fast growing, and fast performing time series database part of the TICK stack, providing also Data Visualization and Alerting.

In this example we will send KPIs, Geo and XRTP Metrics every second to InfluxDB:

/* Parameters for InfluxDB */
#!substdef "!INFLUXDB_HTTP_URL!http://192.168.2.1:8086!g"
#!substdef "!INFLUXDB_DB!homer!g"
#!substdef "!INFLUXDB_PRECISION!u!g"
#!substdef "!INFLUXDB_RETENTION!autogen!g"

/* Parameters for the rtimer module. */
#!substdef "!CHECK_STATS_INTERVAL!1!g"

Exported data can instantly be leveraged using tools such as Grafana, Chronograf, Kapacitor
Elasticsearch

Elasticsearch is a very popular and powerful full-text search-engine based on Lucene and part of the ELK stack alongside Kibana and Logstash.

In this example we will send KPIs, Geo and XRTP Metrics every second to Elasticsearch:

```plaintext
/* Parameters for Elasticsearch */
#!substdef "$ELASTICSEARCH_HTTP_URL:http://127.0.0.1:9200!g"
#!define DO_ELASTICSEARCH

Exported data can instantly be leveraged using tools such as Kibana and alerted with our dedicated FOSS Kibana plugin SENTINEL.
Ladies and Gentlemen, meet our last kidney stone - once completed, HOMER Seven will be usable!
Ladies and Gentlemen, meet our last kidney stone - once completed, HOMER Seven will be usable!
Time’s UP! Thanks for attending our Flash Talk!
Got Questions? Come and ask Us (almost) anything!

Please do help us by supporting the HOMER project!
PS: Testing, Documenting, and Promoting are as valuable as Coding

<table>
<thead>
<tr>
<th>SIPCAPTURE @GITHUB</th>
<th><a href="http://sipcapture.org">http://sipcapture.org</a> + <a href="http://sipcapture.io">http://sipcapture.io</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>HOMER @GITHUB</td>
<td><a href="http://github.com/sipcapture/homer">http://github.com/sipcapture/homer</a></td>
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<td>MAILING-LIST @USERS</td>
<td><a href="https://groups.google.com/forum/#!forum/homer-discuss">https://groups.google.com/forum/#!forum/homer-discuss</a></td>
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