Trace Compass **Cloud**: Eclipse **Trace Compass**'s migration towards **Theia**

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Agenda

- What is tracing?
- Trace Compass Overview
- Migration steps
- New Architecture
- Theia trace extension
- Demo
- Project status

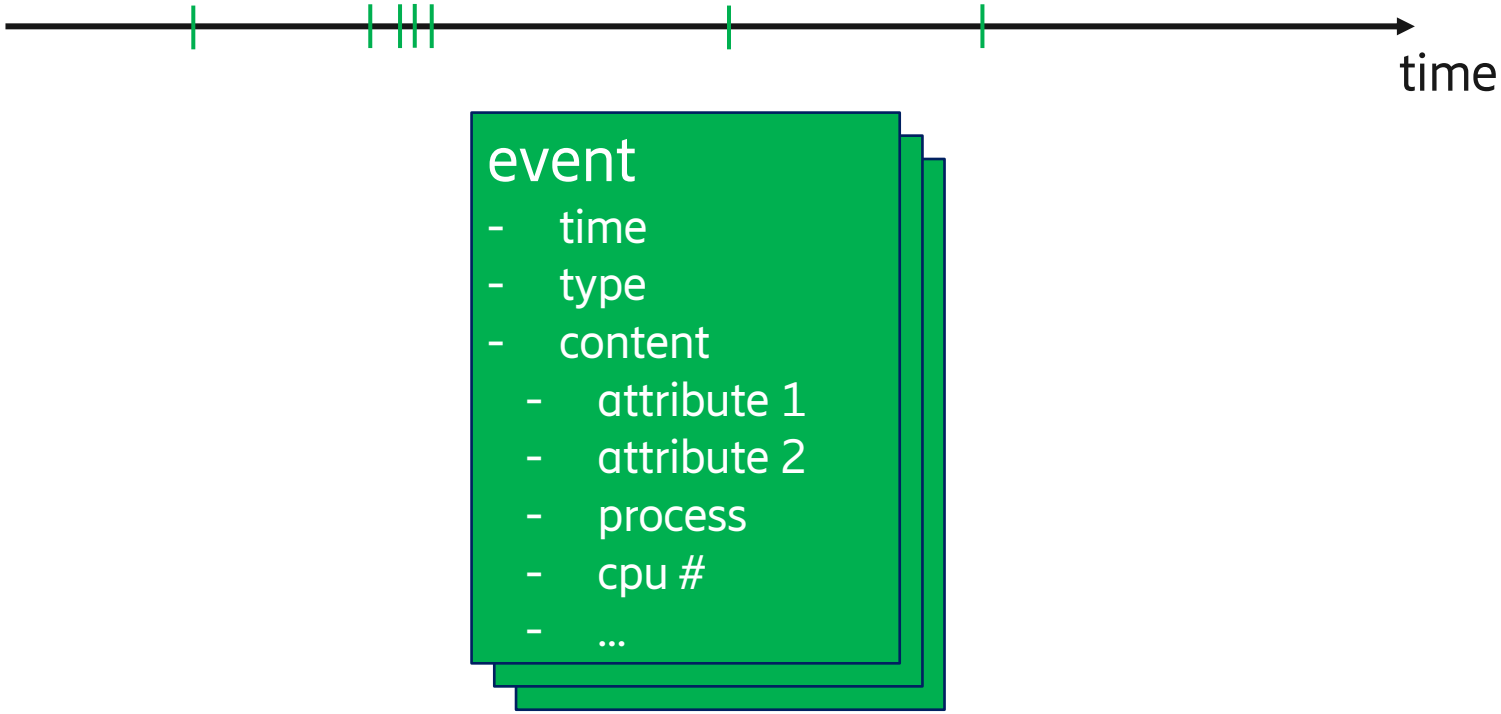
What is tracing?

```
Signal data;
*ap_newSocket >> data;

switch (data.getSignalNumber())
{
    case START_GAME_REQUEST:
    {
        clientName = data.getSignal()->startGameRequest.requester;

        tracepoint(ust_primary,
                   START_GAME_REQUEST_RECEIVE,
                   const_cast<char*> (clientName.c_str()),
                   const_cast<char*> (serverName.c_str()),
                   "START_GAME_REQUEST");

        Signal signal = Signal (START_GAME_REPLY, sizeof(StartGameReply));
        signal.getSignal()->startGameReply.result = true;

        tracepoint(ust_primary, CREATE, const_cast<char*> (clientName.c_str()));

        tracepoint(ust_primary,
                   START_GAME_REPLY_SEND,
                   const_cast<char*> (serverName.c_str()),
                   const_cast<char*> (clientName.c_str()),
                   "START_GAME_REPLY",
                   signal.getSignal()->startGameReply.result);
        *ap_newSocket << signal;

        traceStart = true;
        break;
    }
```

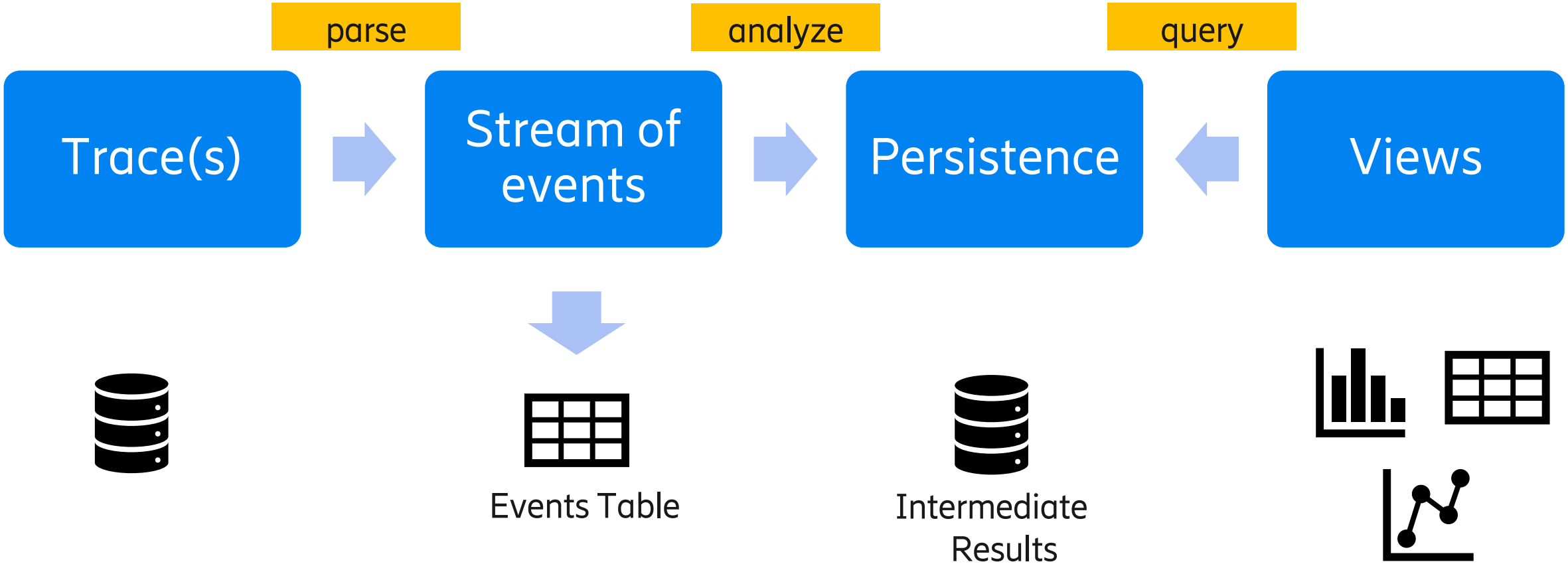
- Instrument source code with tracepoints
- Use a tracer to collects tracepoint data during program execution
- Example tracers
  - LTTng, fTrace, Perf …
- Characteristic of good tracers
  - Low overhead

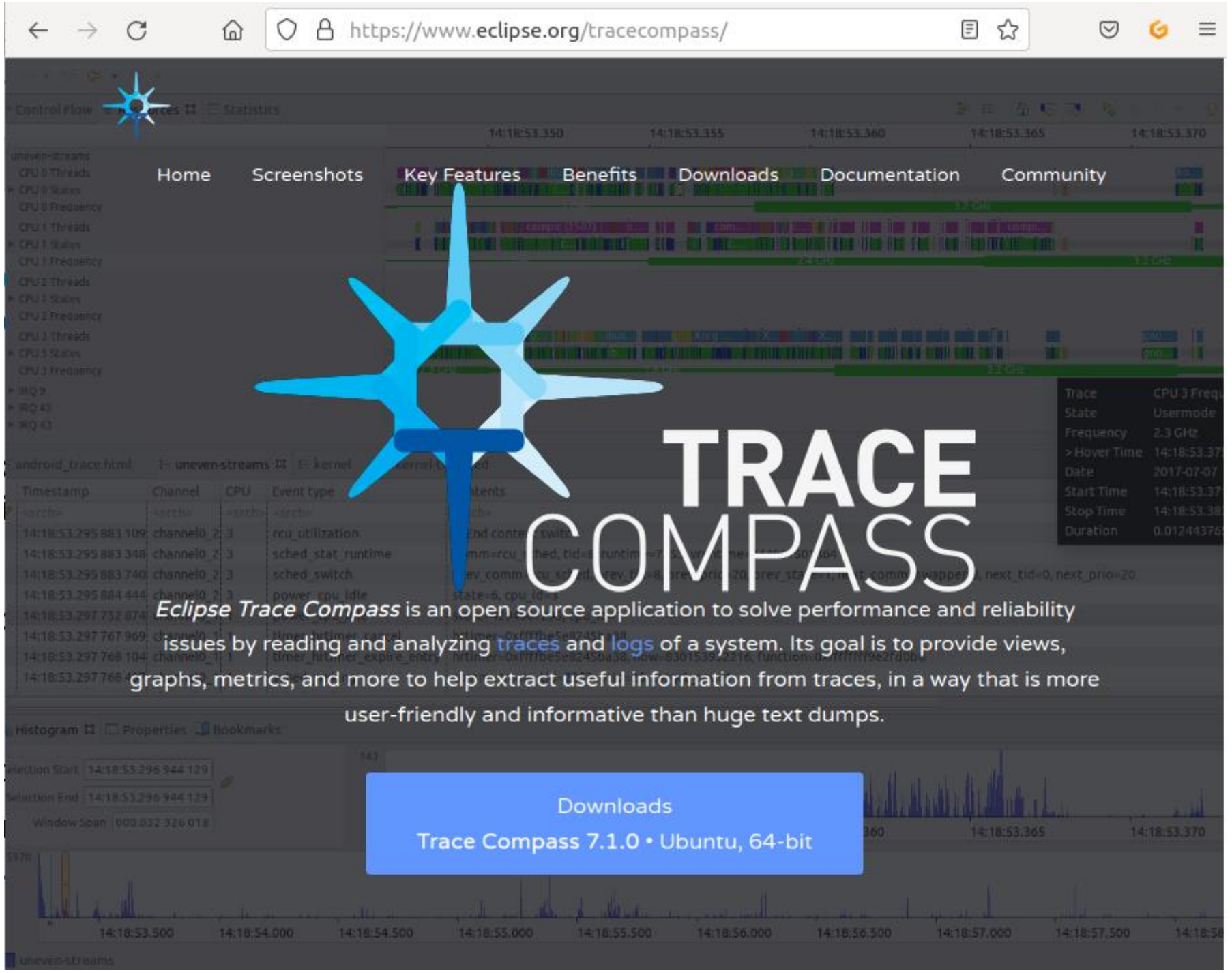
What is a trace?

- A sequence of events collected on the execution path



Trace analysis and visualization flow



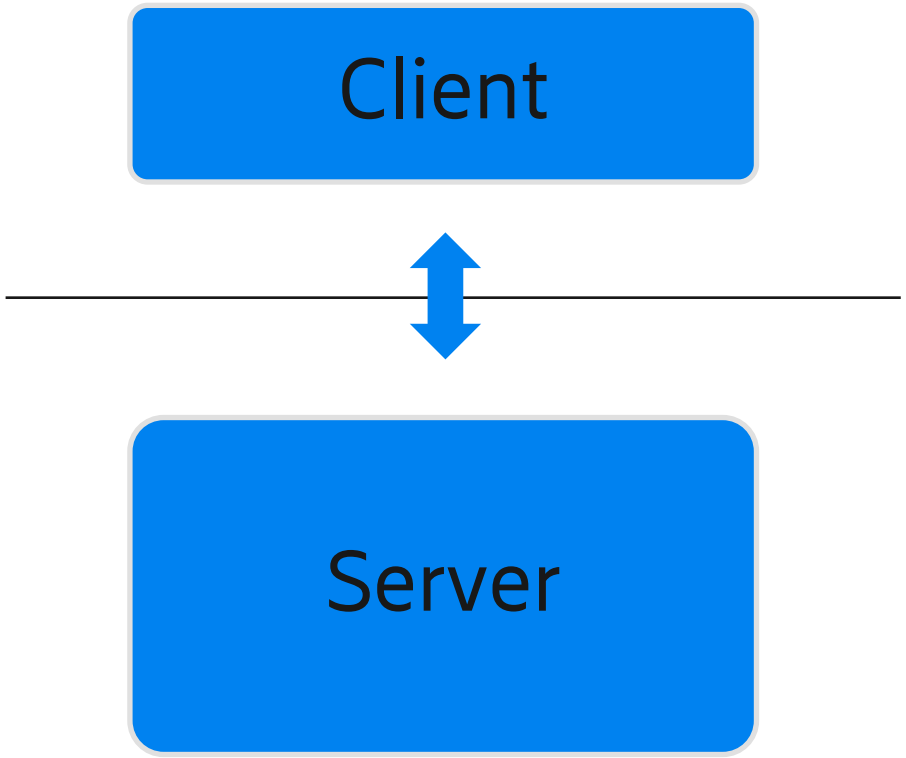

https://www.eclipse.org/tracecompass/
Home
Screenshots
Key Features
Benefits
Downloads
Documentation
Community
TRACE
COMPASS
Eclipse Trace Compass is an open source application to solve performance and reliability issues by reading and analyzing traces and logs of a system. Its goal is to provide views, graphs, metrics, and more to help extract useful information from traces, in a way that is more user-friendly and informative than huge text dumps.
Downloads
Trace Compass 7.1.0 • Ubuntu, 64-bit

Frequent user questions?

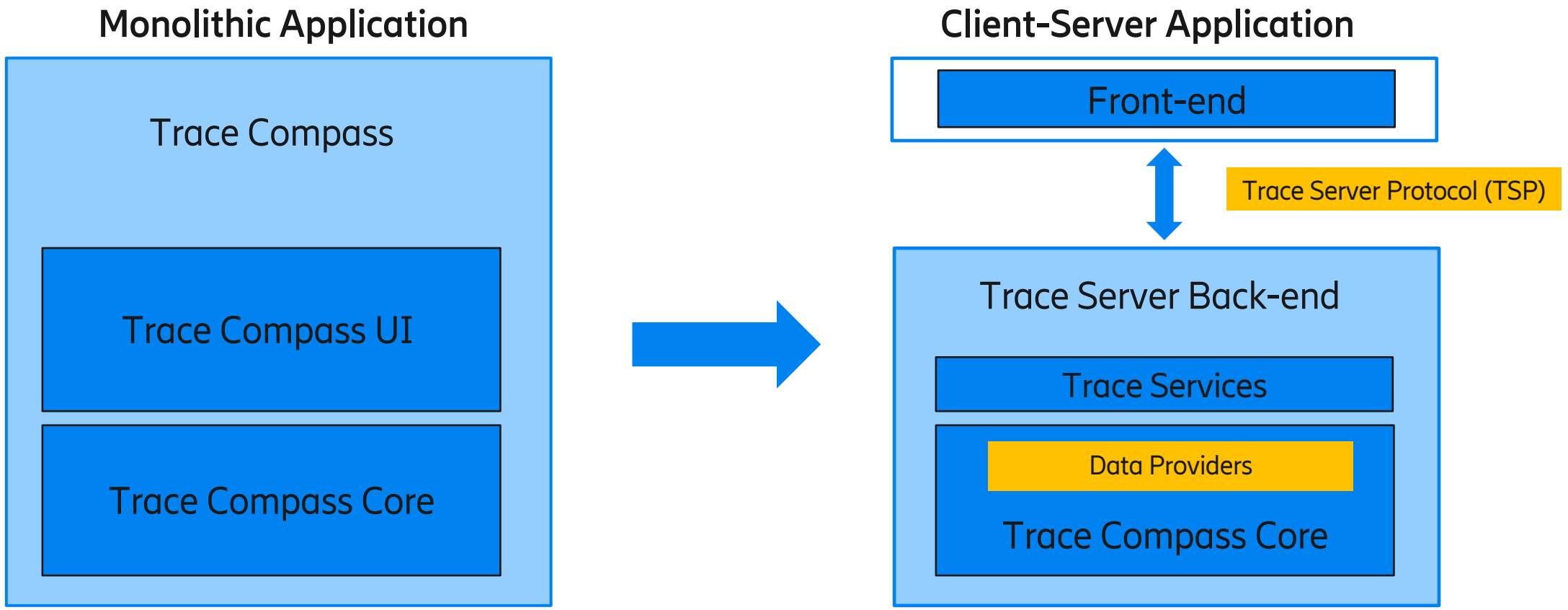
Question	Answer
Can it run in the browser?	No, it's a desktop application
Can we show results in Jenkins?	No, it's a desktop application
Can we run it in headless mode?	You can run custom scripts (EASE), but UI needs to be opened
What about custom graphs?	We are bound to SWT, Jface and Eclipse
Can we get it in Theia or VsCode?	No

Solution: Client – server architecture

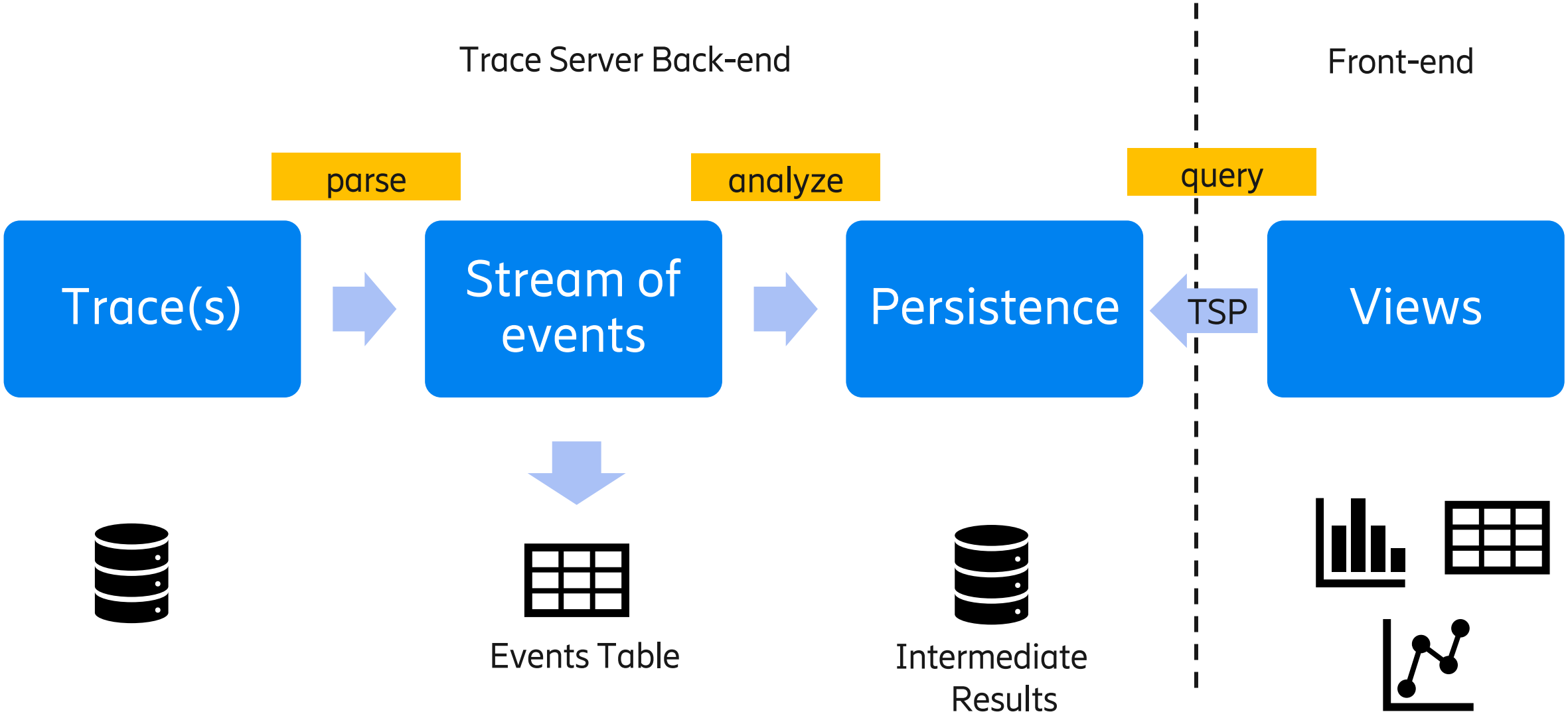
- **Trace visualization front-end**
  - Request data from server
  - Deserializes data
  - Visualizes data in various graphs
- **Trace server back-end**
  - Trace parsing
  - Trace event processing
  - Domain-specific logic
  - Serializes data for visualization
  - Sends data over network to clients

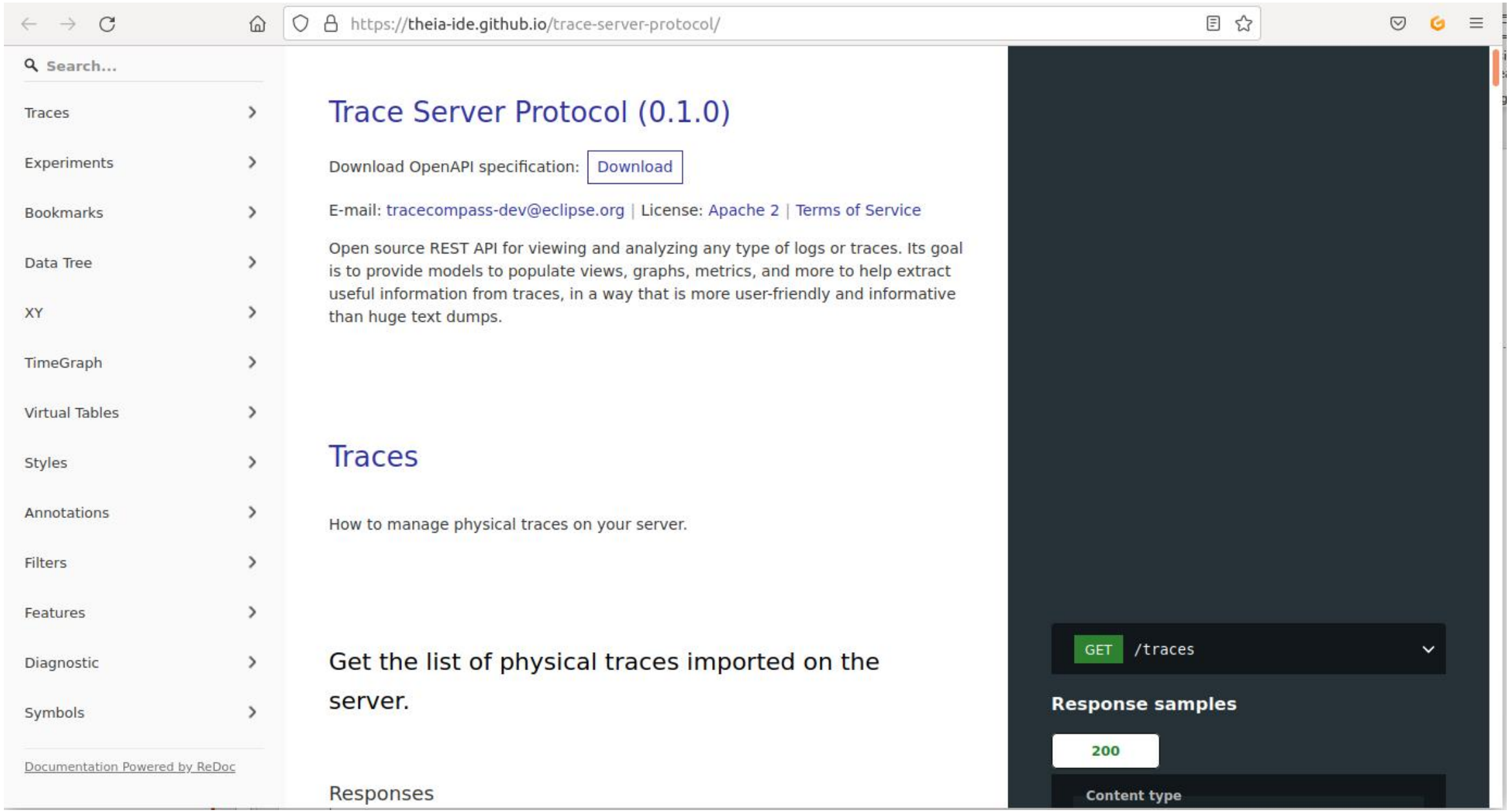


Trace Compass re-architecture



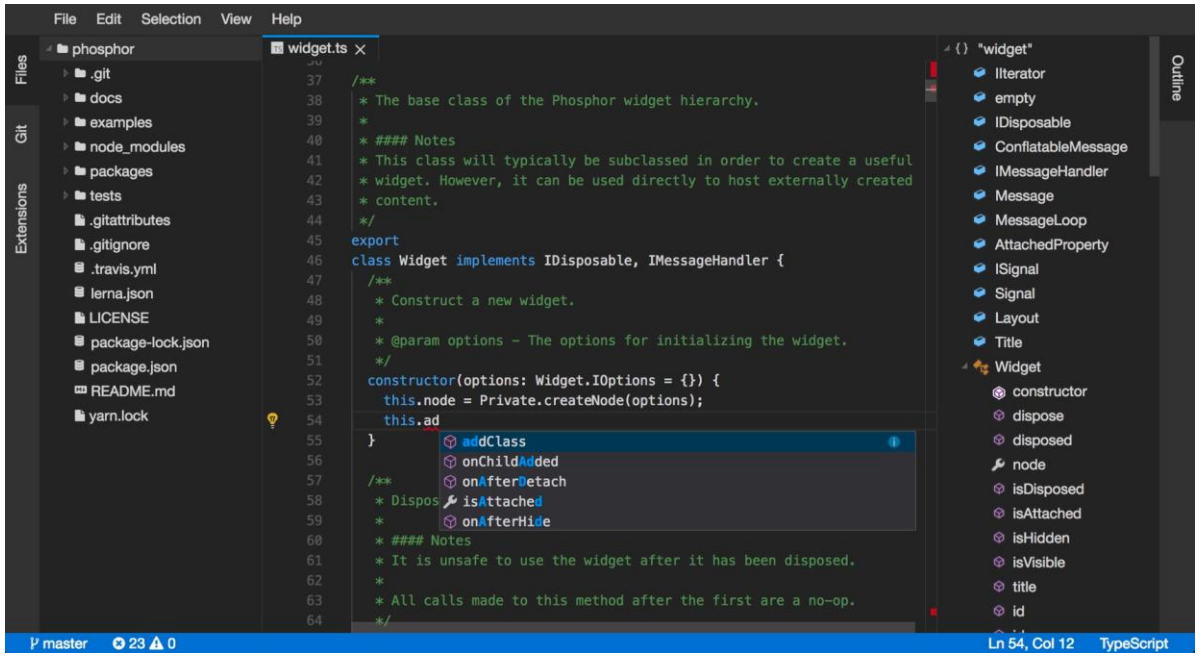
Trace analysis and visualization flow



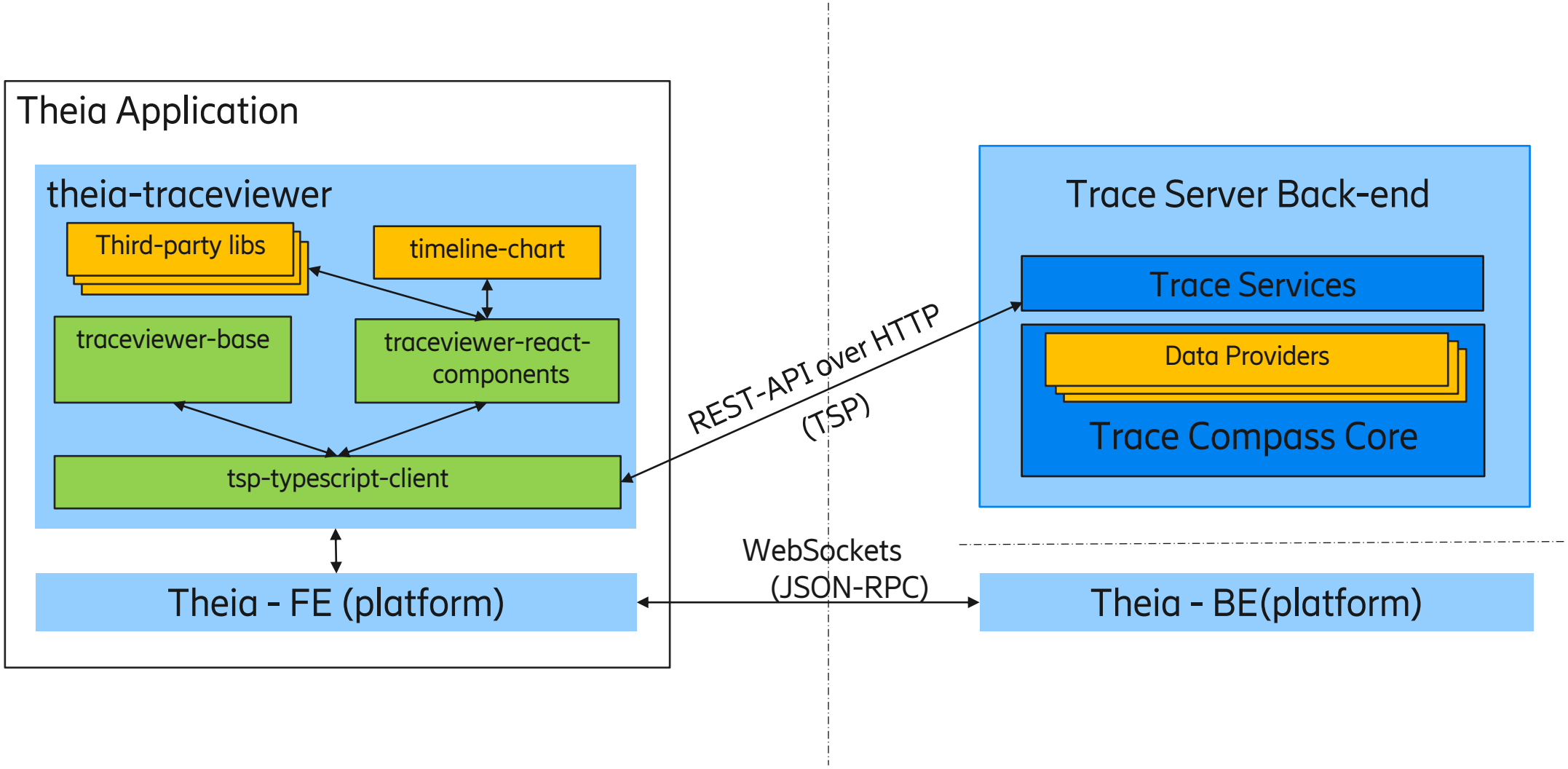

https://theia-ide.github.io/trace-server-protocol/
Search...
Traces
Experiments
Bookmarks
Data Tree
XY
TimeGraph
Virtual Tables
Styles
Annotations
Filters
Features
Diagnostic
Symbols
Documentation Powered by ReDoc
Trace Server Protocol (0.1.0)
Download OpenAPI specification: Download
E-mail: tracecompass-dev@eclipse.org | License: Apache 2 | Terms of Service
Open source REST API for viewing and analyzing any type of logs or traces. Its goal is to provide models to populate views, graphs, metrics, and more to help extract useful information from traces, in a way that is more user-friendly and informative than huge text dumps.
Traces
How to manage physical traces on your server.
Get the list of physical traces imported on the server.
Responses
GET /traces
Response samples
200
Content type

Eclipse Theia

- Extensible platform
- Uses modern web-technologies
- Allows integration with IDE workflow
  - LSP – for language support
  - DAP – for debug support
- Deployment
  - Browser or desktop
  - Workspace managers like Eclipse Che
- Open Source and community
- Vendor neutral



Architecture with Theia



npm

Search packages

Search

theia-traceviewer

0.1.0 • Public • Published 3 days ago

Readme | Explore BETA | 6 Dependencies | 0 Dependents | 14 Versions | Settings

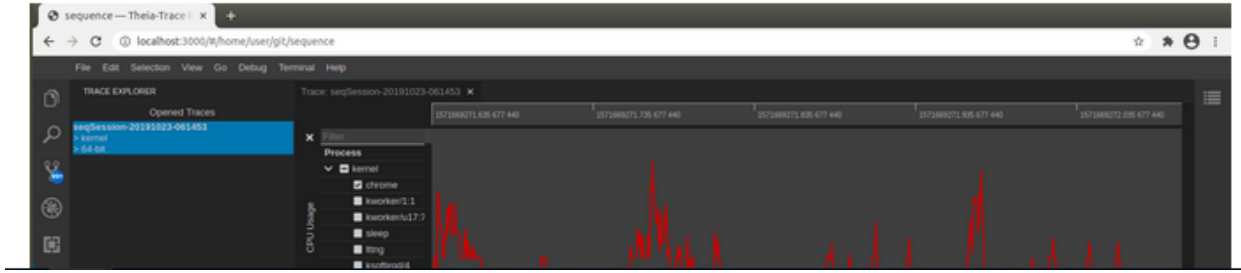
Description

The Theia trace viewer extension is providing a trace viewing front-end to Trace Server applications implementing the Trace Server protocol.

Additional Information

- Theia Trace Viewer Extension
- Trace Server Protocol
- Reference Trace Server - Download (Eclipse Trace Compass)

Screenshots



Install

```
> npm i theia-traceviewer
```

Repository

github.com/theia-ide/theia-trace-ext...

Homepage

github.com/theia-ide/theia-trace-ext...

Weekly Downloads

193

Version

0.1.0

License

MIT

Unpacked Size

243 kB

Total Files

95

npm

Search packages

Search

traceviewer-base

0.1.0 • Public • Published 3 days ago

Readme | Explore BETA | 1 Dependency | 4 Dependents | 14 Versions | Settings

Description

The Trace Viewer base package contains trace management utilities for managing traces using Trace Server applications that implement the Trace Server Protocol (TSP). While being initially used within the Theia Trace Viewer extension, its code base is independent to any Theia APIs and hence can be integrated in other web applications.

Additional Information

- Theia Trace Viewer Extension
- Trace Server Protocol
- Reference Trace Server - Download (Eclipse Trace Compass)

Keywords

none

Install

```
> npm i traceviewer-base
```

Repository

github.com/theia-ide/theia-trace-ext...

Homepage

github.com/theia-ide/theia-trace-ext...

Weekly Downloads

203

Version

0.1.0

License

MIT

Unpacked Size

Total Files

npm

Search packages

Search

traceviewer-react-components

0.1.0 • Public • Published 3 days ago

Readme | Explore BETA | 17 Dependencies | 2 Dependents | 14 Versions | Settings

Description

The Trace Viewer react-components package contains views and utilities for visualizing traces and logs via the Trace Server Protocol connected a Trace Server applications. While being initially used within the Theia Trace Viewer extension, its code base is independent to any Theia APIs and hence can be integrated in other web applications.

Additional Information

- Theia Trace Viewer Extension
- Trace Server Protocol
- Reference Trace Server - Download (Eclipse Trace Compass)

Keywords

none

Install

```
> npm i traceviewer-react-components
```

Repository

github.com/theia-ide/theia-trace-ext...

Homepage

github.com/theia-ide/theia-trace-ext...

Weekly Downloads

199

Version

0.1.0

License

MIT

Unpacked Size

683 kB

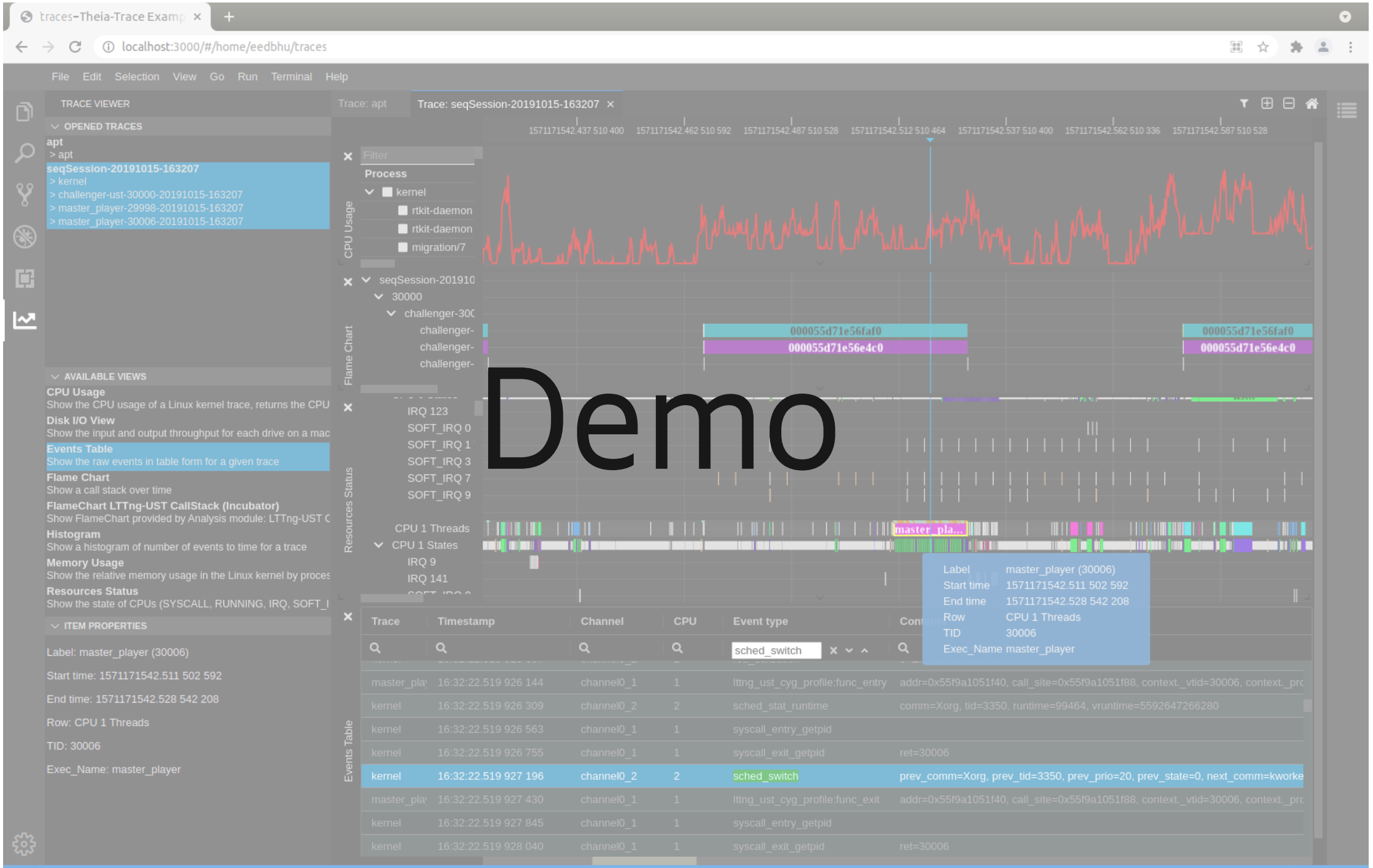
Total Files

184

Other Javascript libraries under development

- **timeline-chart**
  - Timeline / Gantt chart library for large data (e.g. traces)
  - Nano-second precision (bigint)

- **tsp-typescript-client**
    - TSP ready client to perform your requests
    - Abstract the technology used (REST, HTTP)


traces-Theia-Trace Examp
localhost:3000/#/home/eedbhu/traces
File Edit Selection View Go Run Terminal Help
TRACE VIEWER
OPENED TRACES
apt
> apt
seqSession-20191015-163207
> kernel
> challenger-ust-30000-20191015-163207
> master_player-29998-20191015-163207
> master_player-30006-20191015-163207
AVAILABLE VIEWS
CPU Usage
Show the CPU usage of a Linux kernel trace, returns the CPU
Disk I/O View
Show the input and output throughput for each drive on a mac
Events Table
Show the raw events in table form for a given trace
Flame Chart
Show a call stack over time
FlameChart LTTng-UST CallStack (Incubator)
Show FlameChart provided by Analysis module: LTTng-UST C
Histogram
Show a histogram of number of events to time for a trace
Memory Usage
Show the relative memory usage in the Linux kernel by proces
Resources Status
Show the state of CPUs (SYSCALL, RUNNING, IRQ, SOFT_I
ITEM PROPERTIES
Label: master_player (30006)
Start time: 1571171542.511 502 592
End time: 1571171542.528 542 208
Row: CPU 1 Threads
TID: 30006
Exec_Name: master_player
Trace: apt
Trace: seqSession-20191015-163207
1571171542.437 510 400
1571171542.462 510 592
1571171542.487 510 528
1571171542.512 510 464
1571171542.537 510 400
1562 510 336
1571171542.587 510 528
CPU Usage
Flame Chart
Resources Status
Events Table
Process
kernel
rtkit-daemon
rtkit-daemon
migration/7
seqSession-201910
30000
challenger-300
challenger-
challenger-
challenger-
000055d71e56faf0
000055d71e56e4c0
000055d71e56faf0
000055d71e56e4c0
IRQ 123
SOFT_IRQ 0
SOFT_IRQ 1
SOFT_IRQ 3
SOFT_IRQ 7
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CPU 1 Threads
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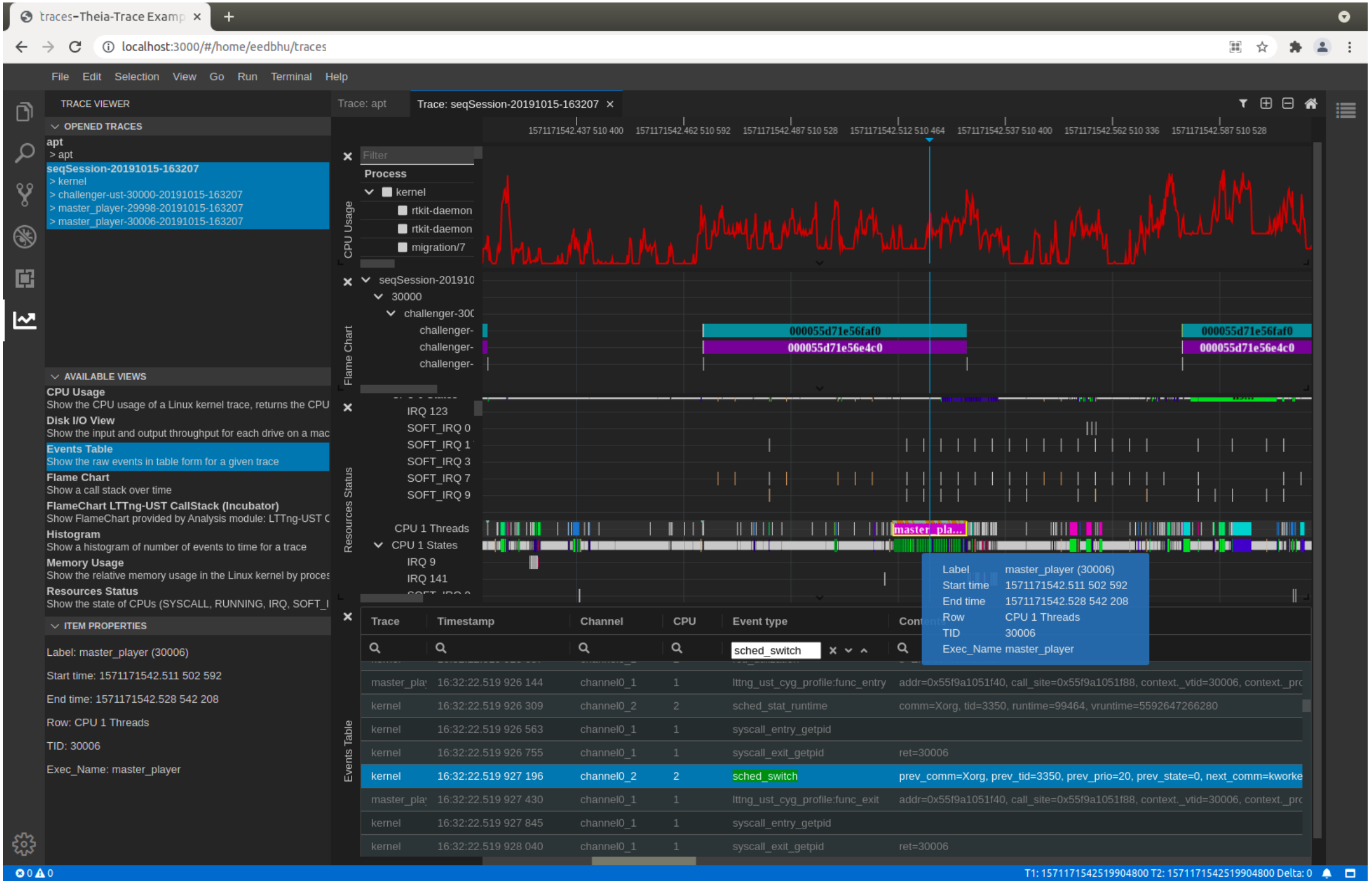
Trace
Timestamp
Channel
CPU
Event type
sched_switch
master_pla 16:32:22.519 926 144 channel0_1 1 lttng_ust_cyg_profile:func_entry addr=0x55f9a1051f40, call_site=0x55f9a1051f88, context._vtid=30006, context._prc
kernel 16:32:22.519 926 309 channel0_2 2 sched_stat_runtime comm=Xorg, tid=3350, runtime=99464, vruntime=5592647266280
kernel 16:32:22.519 926 563 channel0_1 1 syscall_entry_getpid
kernel 16:32:22.519 926 755 channel0_1 1 syscall_exit_getpid ret=30006
kernel 16:32:22.519 927 196 channel0_2 2 sched_switch prev_comm=Xorg, prev_tid=3350, prev_prio=20, prev_state=0, next_comm=kworke
master_pla 16:32:22.519 927 430 channel0_1 1 lttng_ust_cyg_profile:func_exit addr=0x55f9a1051f40, call_site=0x55f9a1051f88, context._vtid=30006, context._prc
kernel 16:32:22.519 927 845 channel0_1 1 syscall_entry_getpid
kernel 16:32:22.519 928 040 channel0_1 1 syscall_exit_getpid ret=30006
Demo
T1: 1571171542519904800 T2: 1571171542519904800 Delta: 0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30000
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challenger-
challenger-
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000055d71e56faf0
000055d71e56e4c0
000055d71e56faf0
000055d71e56e4c0
Resources Status
IRQ 123
SOFT_IRQ 0
SOFT_IRQ 1
SOFT_IRQ 3
SOFT_IRQ 7
SOFT_IRQ 9
CPU 1 Threads
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IRQ 9
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Channel
CPU
Event type
sched_switch
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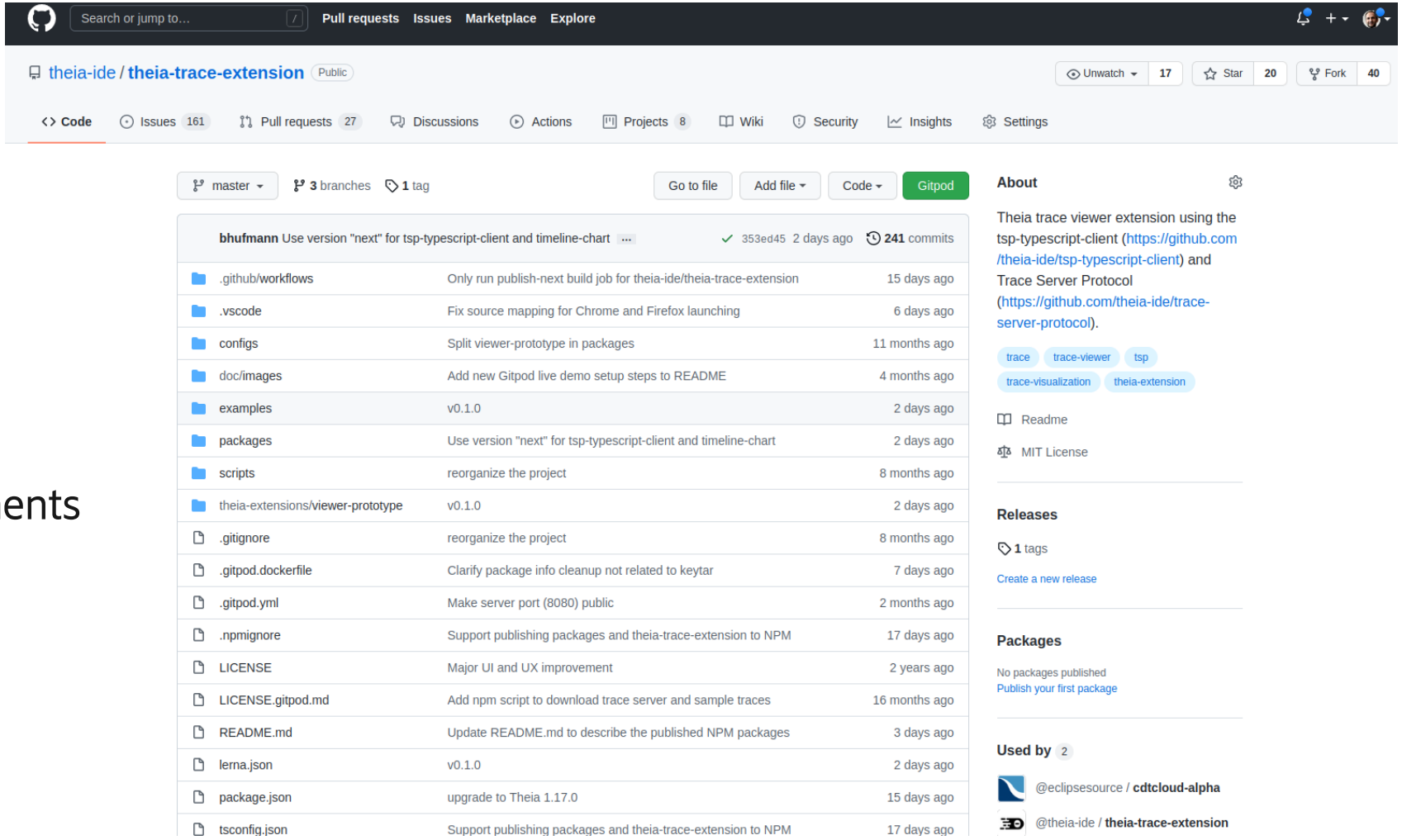
0 0
T1: 1571171542519904800 T2: 1571171542519904800 Delta: 0

Project status

https://github.com/theia-ide/theia-trace-extension

- Development ongoing
- Project Planning
- Issues trackers
- NPM packages
  - theia-traceviewer
  - traceviewer-base
  - traceviewer-react-components
- MVP release end-of year



Python Client (tsp-python-client)

- Can be used to automate analysis (Headless mode)
- Rapid prototyping
  - Run REST API calls from command-line
  - Verify server responses
  - No UI needed
- TSP ready client to perform your requests

VsCode Plugin

https://github.com/theia-ide/vscode-trace-extension

- Prove of concept
- Uses **traceviewer-base** and **traceviewer-react-components**
- Glue code to integrate with VsCode
  - WebViews for each react-component
  - Side panel
  - Menus and commands
- Misses some features that are implemented in theia-traceviewer (Theia APIs)
  - Issue trackers available
- Not a focus right now
  - If interested, contributions are very welcome

Frequent user questions?

Question	Answer
Can it run in the browser?	Yes, trace visualization front-end can run in the browser
Can we show results in Jenkins?	Jenkins plug-in can query trace server and show results
Can we run it in headless mode?	Command-line client can start analysis in a trace server BE
What about custom graphs?	Many modern web-technologies and libraries exit
Can we get it in Theia or VsCode?	Yes, trace visualization front-end integrates with both

Q & A

References

- Theia trace extension and project page
  - https://github.com/theia-ide/theia-trace-extension
- Trace Server Protocol (TSP)
  - https://github.com/theia-ide/trace-server-protocol
- Client-side TSP implementation
  - https://github.com/theia-ide/tsp-typescript-client
  - https://github.com/theia-ide/tsp-python-client
- VsCode Plug-in
  - https://github.com/theia-ide/vscode-trace-extension
- Timeline-chart
  - https://github.com/theia-ide/timeline-chart

References

- Trace Compass
  - https://www.eclipse.org/tracecompass/
  - https://projects.eclipse.org/projects/tools.tracecompass
  - https://projects.eclipse.org/projects/tools.tracecompass.incubator

Contacts

- Presenter
  - Bernd Hufmann: bernd.Hufmann@ericsson.com
- theia-trace-extension
  - https://github.com/theia-ide/theia-trace-extension
- Eclipse Trace Compass
  - Mailing list: tracecompass-dev@eclipse.org
  - IRC: oftc.net #tracecompass