INCHRON
THINK REAL-TIME

Real-Time Performance Analysis on Infineon AURIX™

The Timing Aspect

From Pioneer to Key Partner

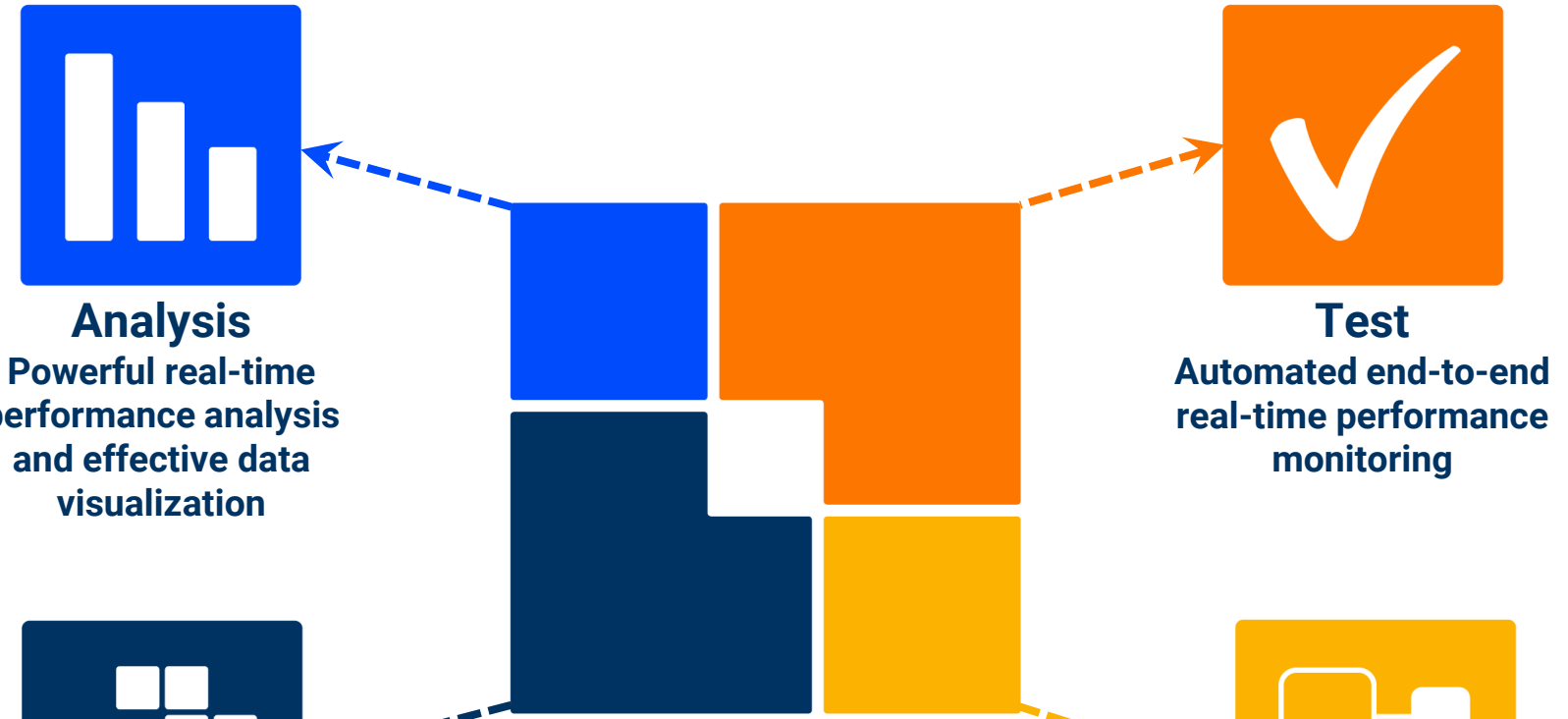
Pioneer in advanced **real-time systems** development **methodology**

Comprehensive portfolio of **state-of-the-art tools** and **services**

17+ year track record in

- Supporting customers in developing **excellent products** for a highly competitive mass market
- Making complex real-time systems development **predictable**
- Making legacy systems **transparent**
- **Optimizing** bill of materials

INCHRON Tool-Suite



Analysis
Powerful real-time performance analysis and effective data visualization

Test
Automated end-to-end real-time performance monitoring

INCHRON Tool-Suite
Comprehensive solution for the development of real-time systems

Optimization
State-of-the-art real-time performance optimization

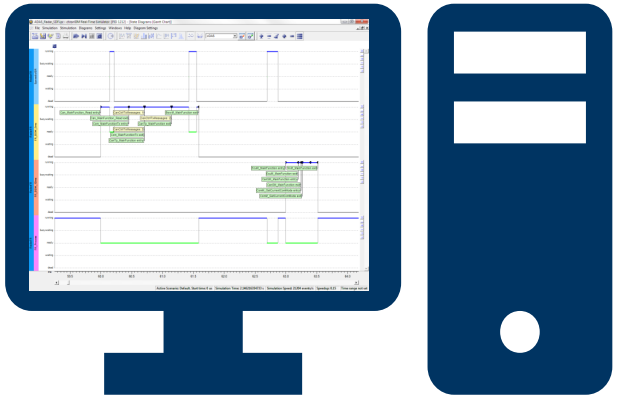
Design
Real-time performance designed-in right from the beginning

Timing Analysis on AURIX™

No 3rd party trace hardware required!

Infineon AURIX™ emulation device

USB



INCHRON Tool-Suite

Environment – Technical Details

Infineon Triboard/Application Kit

- AURIX™ with MCDS

Custom Hardware

- Infineon “miniWiggler” for device access

Infineon DAS

- DAS UDAS Server

INCHRON Tool-Suite

- INCHRON Trace Importer for trace generation
- Configurations for trace, view profile and requirements

Trace Importer – OS With Dynamic Load – Direct Trace Conversion

Typically a one-time configuration effort per project:

- Identify relevant variables in source code, get respective addresses from map file
- Fill the information into the JSON manifest:

```
"config": {
    "elf": ["TC39B_OsInchronVarLoadTFT_Tricore.elf"],
    "use_mcds": "task_core0_mcdsc",
    "mcds": [{
        "name": "task_core0_mcdsc",
        "dump_mcds": true,
        "dump_mcdsc": true,
        "mode": "continuous",
        "num_trace_bytes_kb": 1000,
        "reset_mcds_first": true,
        "config": {
            "ocds_suspend_trigger": "trace_rec",
            "reset_trigger": {
                "activation": "application",
                "action": "trace_rec"
            },
            "mcx_time": "ticks",
            "trigger_pos": "perc30",
            "opoints": [{
                "name": "cpu0",
                "status_trace": false,
                "program_trace": {
                    "address": [
                        { "from": "TestApp_100ms_C0", "to": "TestApp_10ms_WorkerA_Sub_C0+0x13"}
                        ]
                },
                "program_trigger": {
                    "address": { "from": "TestApp_100ms_C0" },
                    "action": "trace_rec"
                },
                "data_trace": {
```

- Start the tracing triggered by the JSON manifest

SW Example - OS With Dynamic Load

The INCHRON Tool-Suite converts the trace from the target.

The trace data can also be saved as an MCDS file.

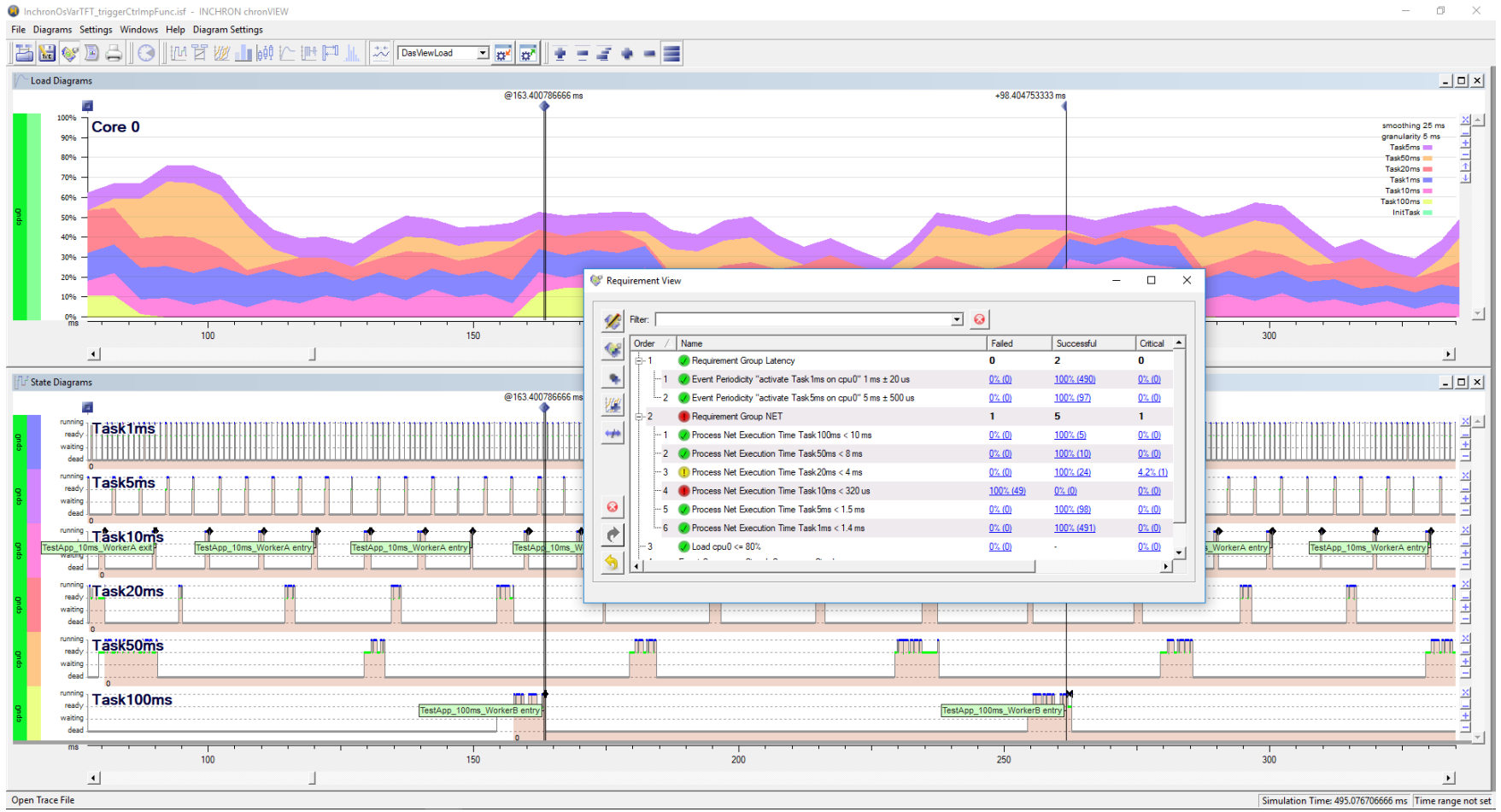
Optional:

- Load Requirements configuration
- Load View Profile configuration

Trace Visualization & Analysis

1) Load view profile and timing requirements

2) Report and trace are showing the system behaviour:



Trace Trigger and Function Visualization

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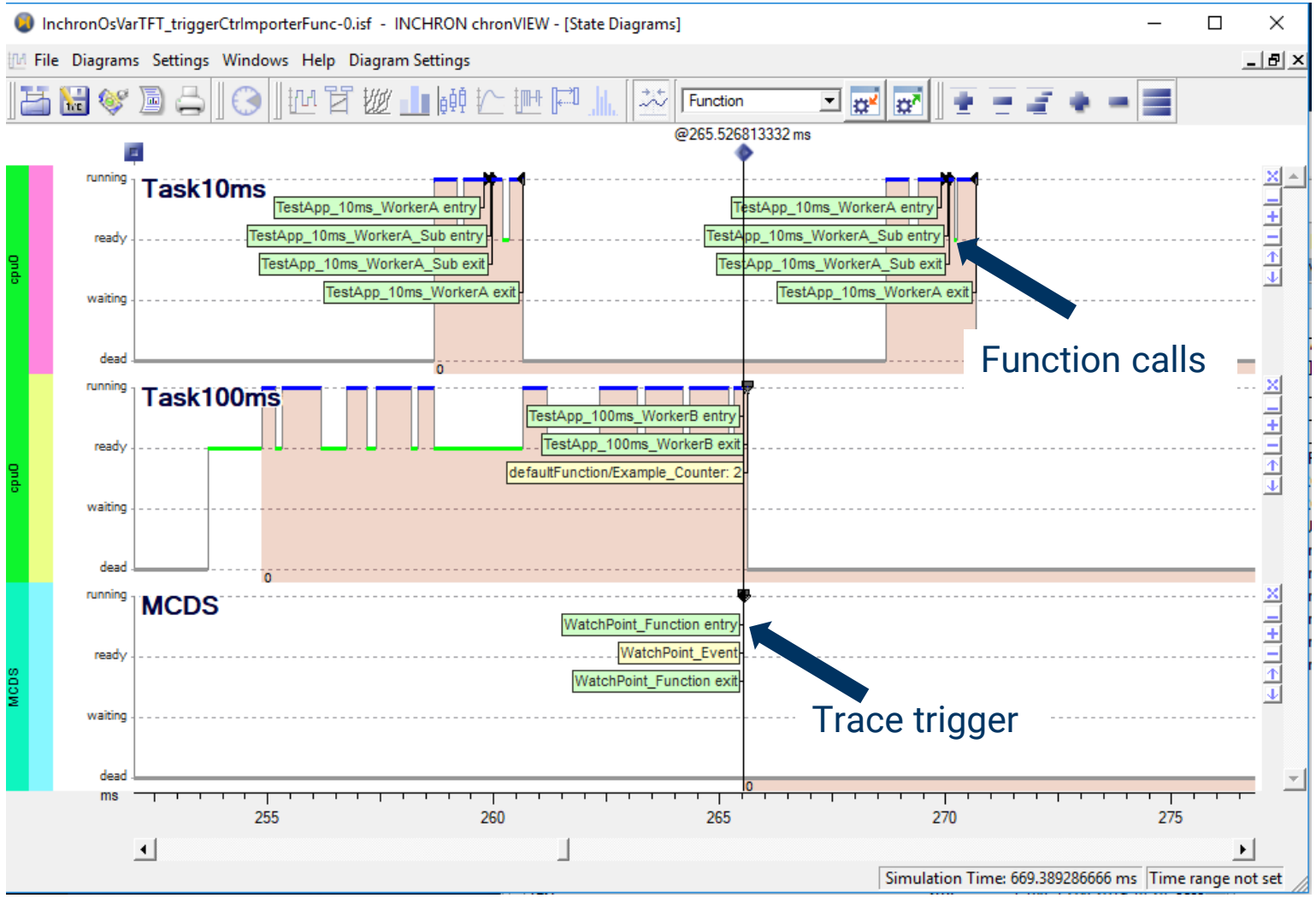
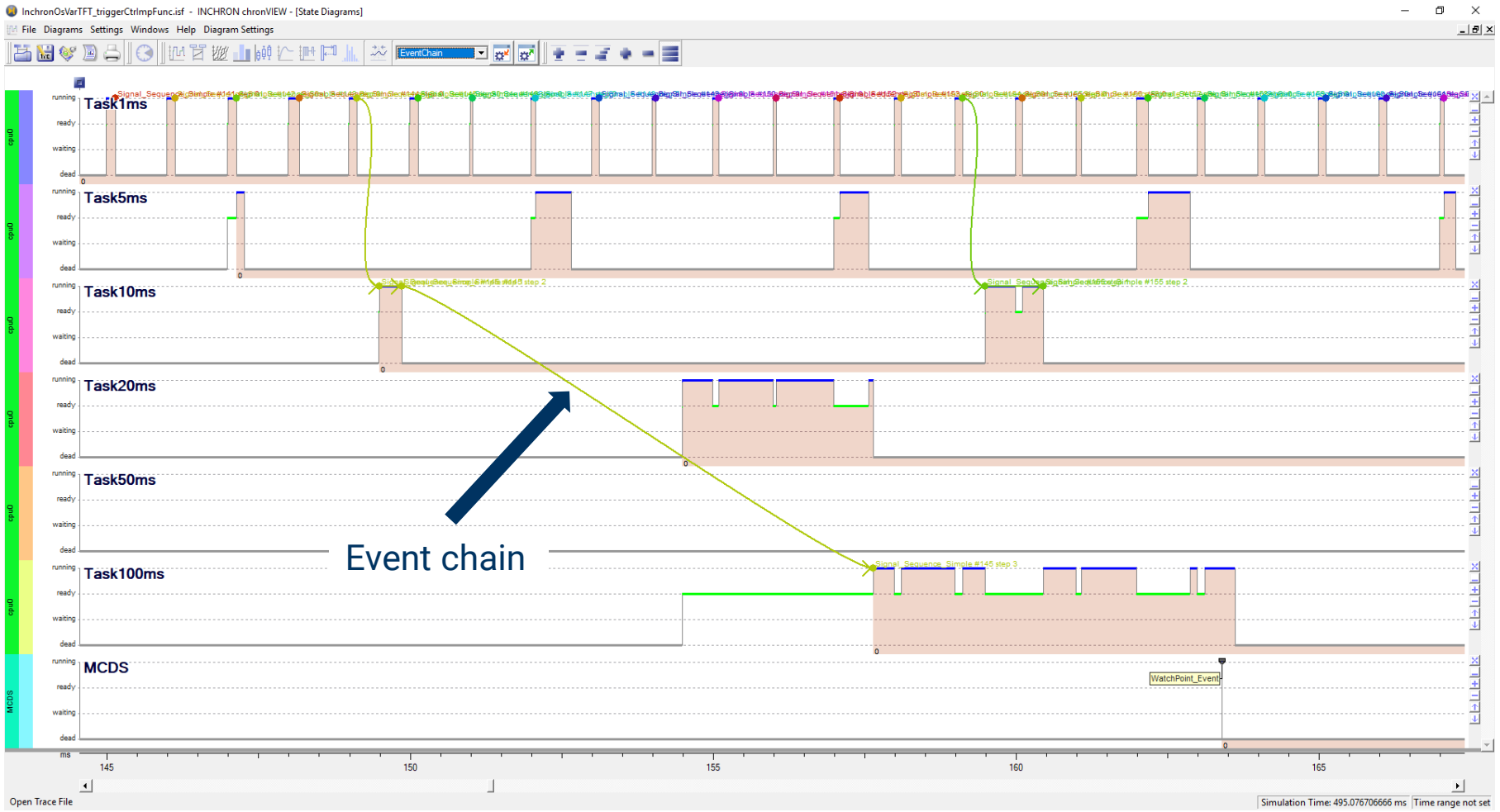
Automatically include all functions and triggers from trace file:



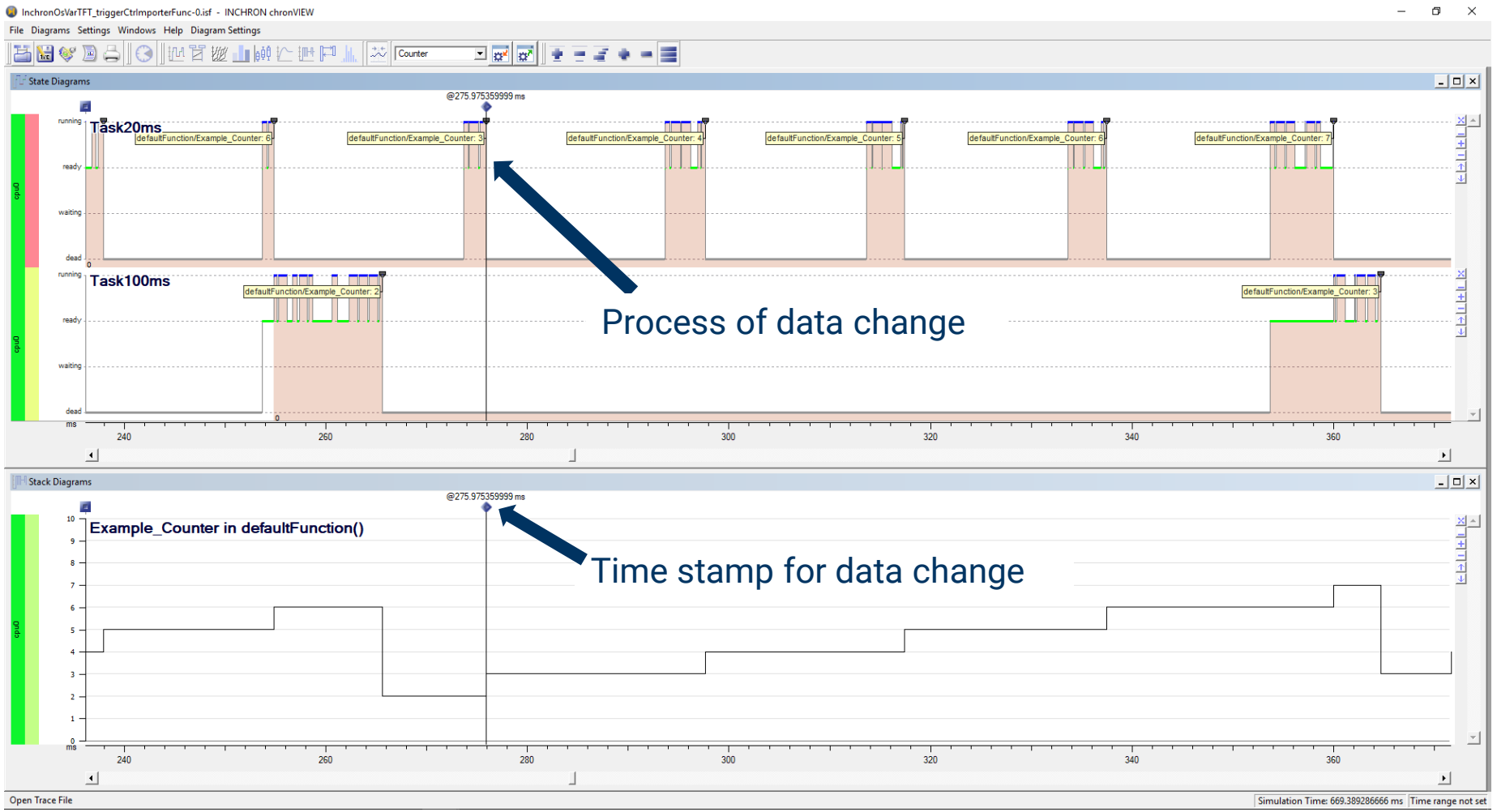
Timing Analysis of Event Chains

Add event chains and compare end-to-end latencies against requirements:



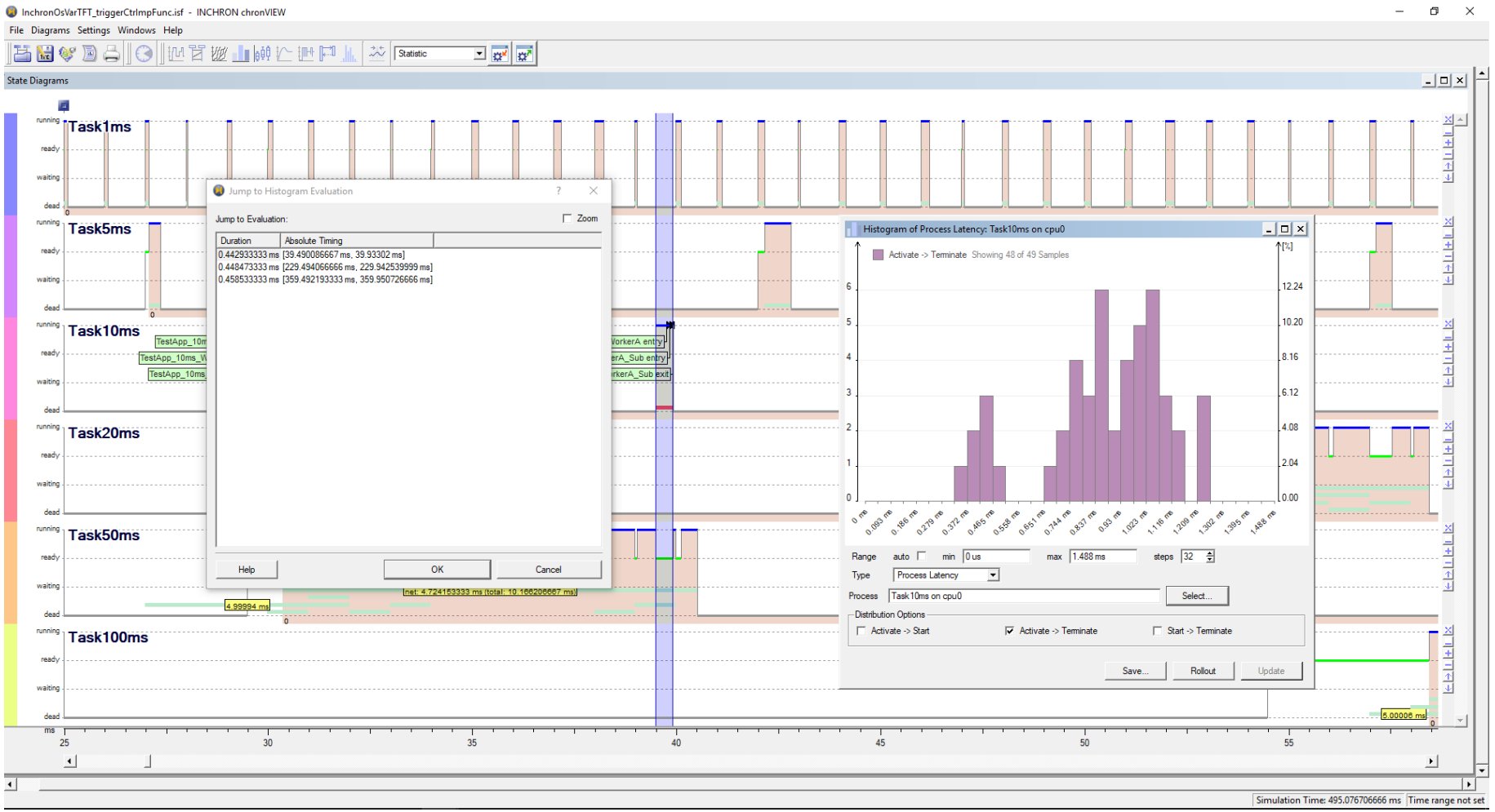
Timing Analysis of Data Values

Visualize how values change over time:



Statistics View – Distribution of Task Runtimes

For detailed analysis, jump to each individual occurence that contributes to a given bar in the histogram:

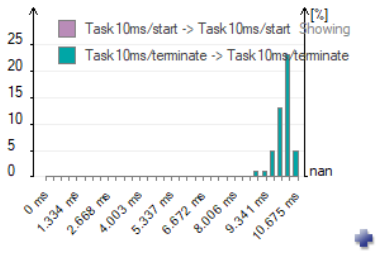
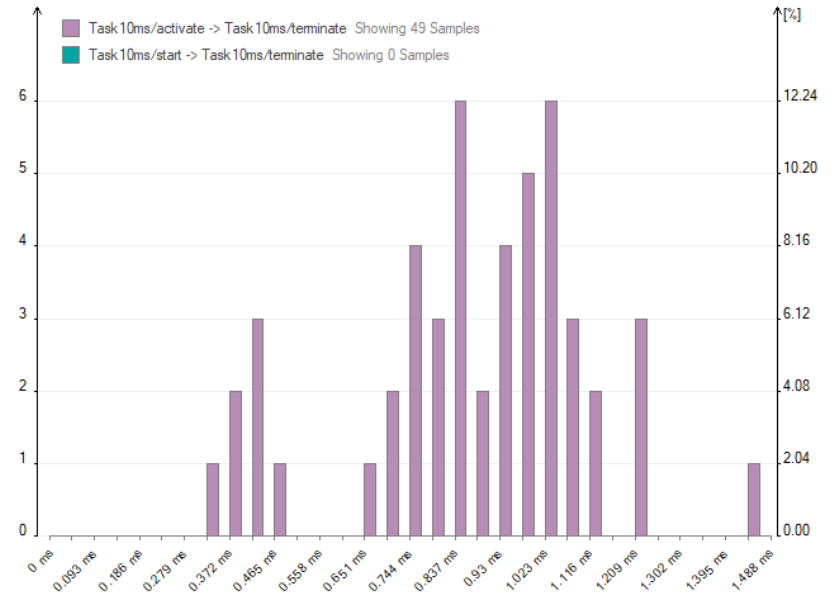


Detailed Statistics – Comprehensive Report

The generated report shows comprehensive timing data.
See the excerpt below:

RTOS Errors	Total	TerminateTask	Activation Limit	Memory Access	Division by Zero	RTOS Object	API Call	ISR Lost
Active	0	0	0	0	0	0	0	0
Passive	0	0	0	0	0	0	0	0

Times	Avg	Min	Max	Total
Net Execution Times	787.429659 us	330.626667 us	1.341380000 ms	38.584053333 ms
Gross Execution Times	883.894285 us	330.626667 us	1.485953333 ms	43.310820002 ms
Response Times	886.512380 us	333.406667 us	1.488580000 ms	43.439106668 ms

Process Jitter	Start Latency	Termination Latency
		

Visualization & Analysis Provide Deep Insights

State View

Gantt View

Trace View

Detailed Statistics

Requirements

Event Chains

Histogram

Load View

INCHRON Tool-Suite - Summary

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Provides comprehensive insights into run-time behavior on AURIX™

- Using Infineon AURIX™ emulation devices and Infineon's Direct Access Server (DAS) → **no need for additional trace hardware**
- Alternatively using tracing solutions provided by iSYSTEM, Lauterbach, Gliwa
- Powerful visualization & graphical timing analysis capabilities
  - On ISR, task, function, runnable, core, microcontroller and system levels
- Comprehensive automated timing analysis capabilities
  - Based on timing requirements
  - Detailed timing analysis of event chains
- For development, integration, test

Goes far beyond analysis of measurements

- Design – excellence in real-time, designed-in right from the beginning
- Optimization – automated state-of-the-art real-time performance optimization

Safety requires perfect synchronization in time

Learn More

INCHRON website: www.inchron.com

INCHRON Tool-Suite & Infineon AURIX™: https://www.inchron.com/unlocking-the-potential/

INCHRON references: www.inchron.com/voices-of-our-customers/

INCHRON for automotive: www.inchron.com/automotive/

INCHRON Tool-Suite: www.inchron.com/tool-suite/

INCHRON Tool-Suite user manual: www.inchron.com/manuals/current/

Infineon DAS (Direct Access Server) tool interface:
www.infineon.com/cms/en/product/promopages/das/

Thank you

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