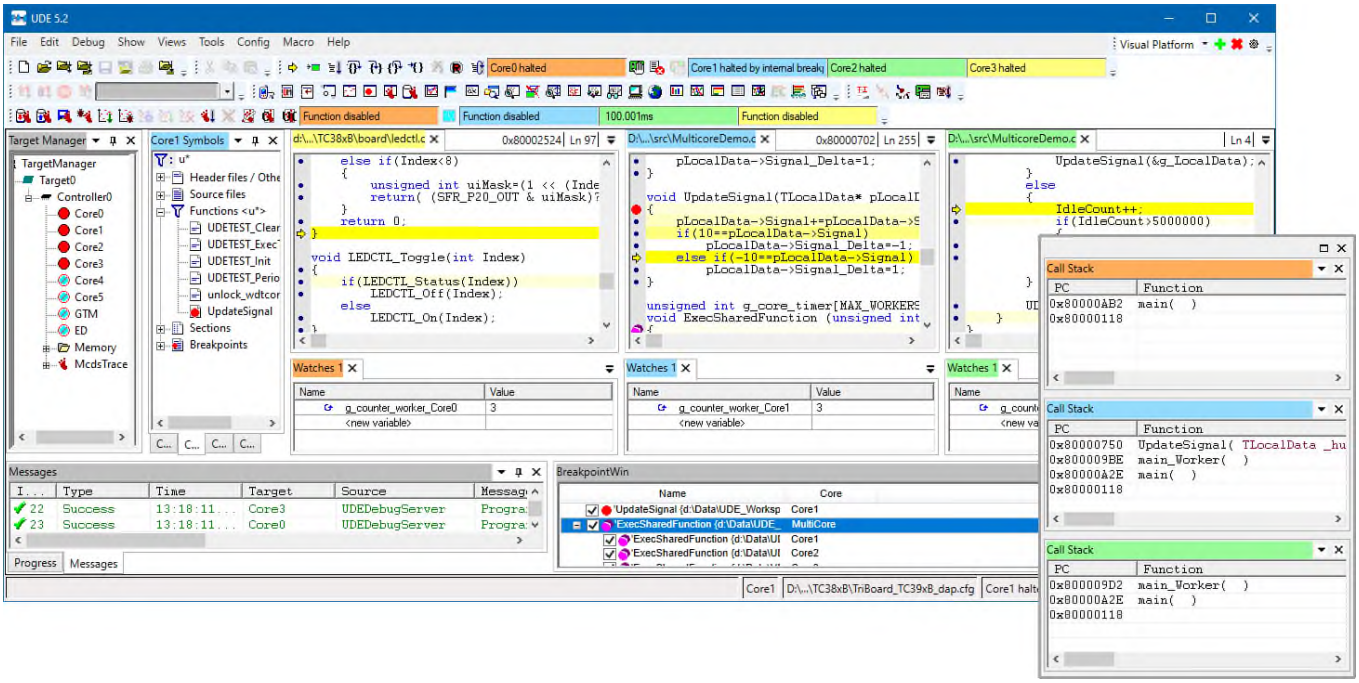
# UDE Multi-Core Debugging

## Synchronized Debugging of Multi-Core Applications

The **Universal Debug Engine® (UDE)** is a powerful development platform for debugging, testing and system analysis of microcontroller software applications. UDE enables efficient and convenient control and monitoring of multiple cores for a wide range of multi-core architectures within a single common user interface.

### Easy-to-Use Debugger Framework

UDE offers a modern and user-friendly user interface that provides a system centric view rather than a core centric view of the multi-core system. The user interface allows a comprehensive and clear view of the entire system or, optionally, of selected parts.




- All cores are visible in a **single common user interface**
- Easy and fast creation of a debug session via a **guided setup process**
- **Preconfigured target configurations** for a large number of evaluation boards
- **UDE Target Manager** provides an overall view to the multi-core system as well as central functions for run-control
- **Core specific colors** for windows and toolbar controls to highlight their core association
- **Convenient window management** allows the debugger session to be adapted to the preferences of the user (e.g. docked windows, floating windows, multi-monitor operation)

### Debug Synchronization

- Simultaneous stop, single step and restart of software execution running on different cores
- Utilization of on-chip debug functions for minimal latencies
- Support for homogeneous and heterogeneous multi-core systems including special cores (e.g. GTM, HSM, eTPU, and others)

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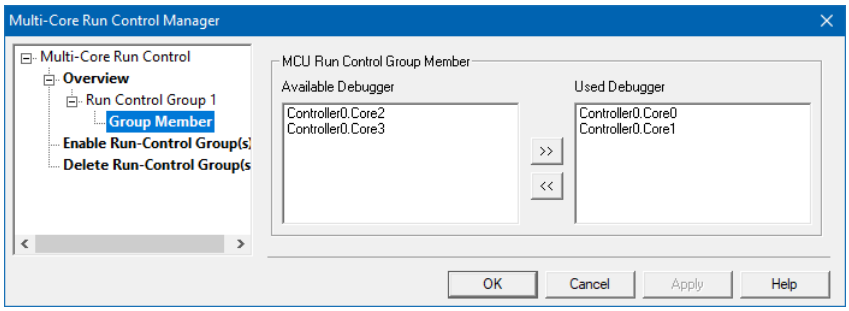
## Multi-Core Run Control

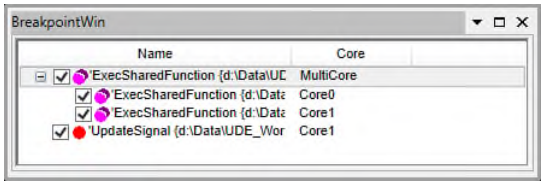
Users can configure multi-core debug synchronization very flexibly and according to their requirements. There are basically three operating modes supported by UDE for debugging multi-core applications:

- **Fully synchronized.**
  Simultaneous stop, single step and restart of all cores.
- **Partially synchronized.**
  Simultaneous stop, single step and restart of a group of selected cores. Independent run-control for all other cores.
- **No debug synchronization.**
  Independent run-control for all cores.

**UDE Multi-Core Run Control Manager** enables flexible configuration and offers a user-friendly way of grouping cores in order to implement the intended synchronization mode.




**Multi-Core Breakpoints** employed in shared code simplify debugging of complex applications. The Multi-Core Breakpoint always takes effect regardless of which core is currently executing the particular code.

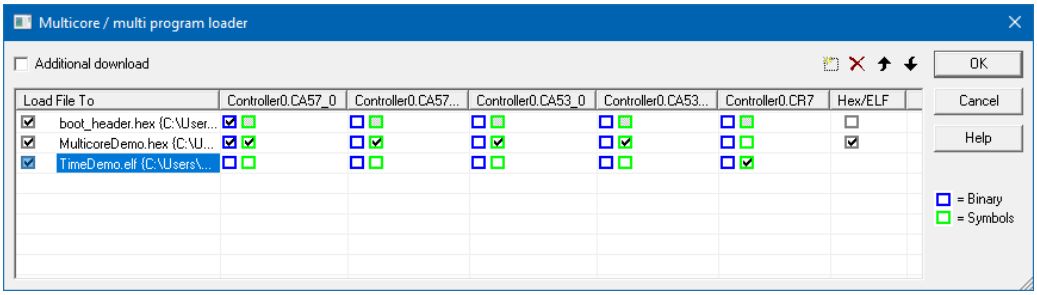



## Multi-Core / Multi-Program Loader

The **UDE Multi-Core / Multi-Program Loader** takes care of loading program binary files into the various cores of the multi-core system and manages the debug information that is used by the UDE.

- Support for monolithic program binaries (single ELF file) and separate ELF files per core
- Support for various binary formats (e.g. ELF, HEX, AFX, etc.)
- Manages architecture specific memory devices (e.g. shared program flash, core specific local memories)

  Assignment of debug information to cores

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