

AUTOSAR Model

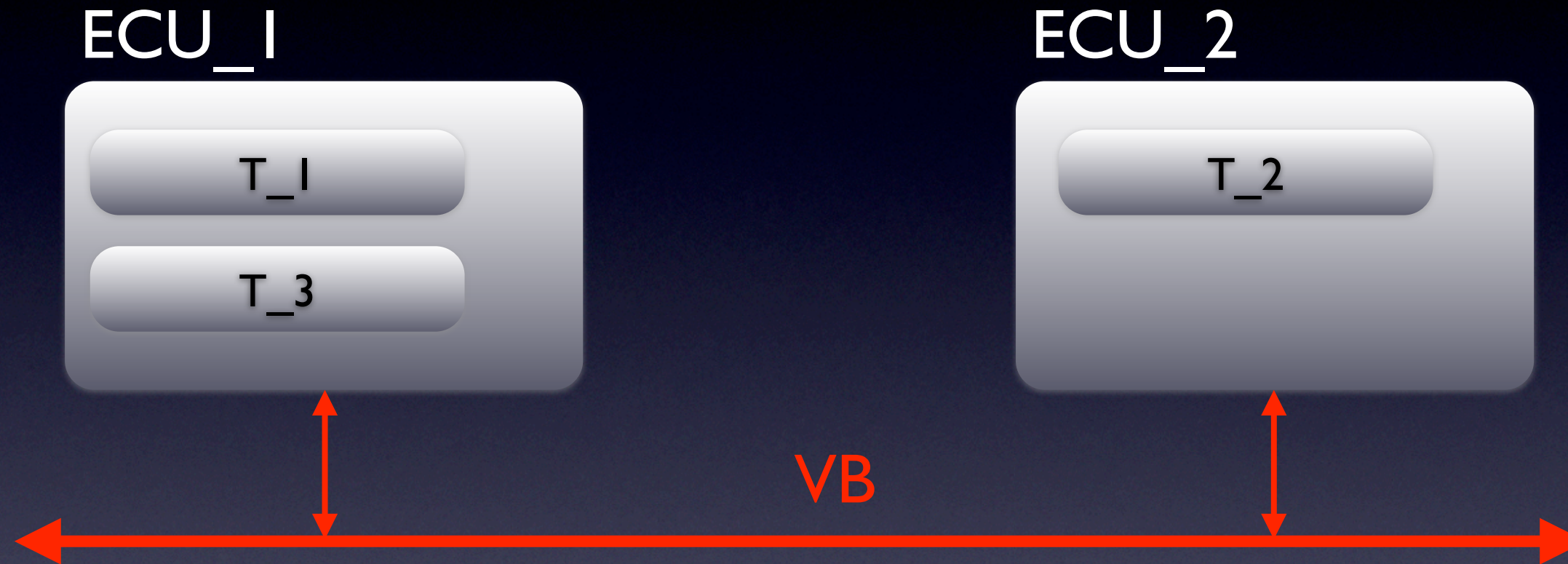
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WatchDog Manager

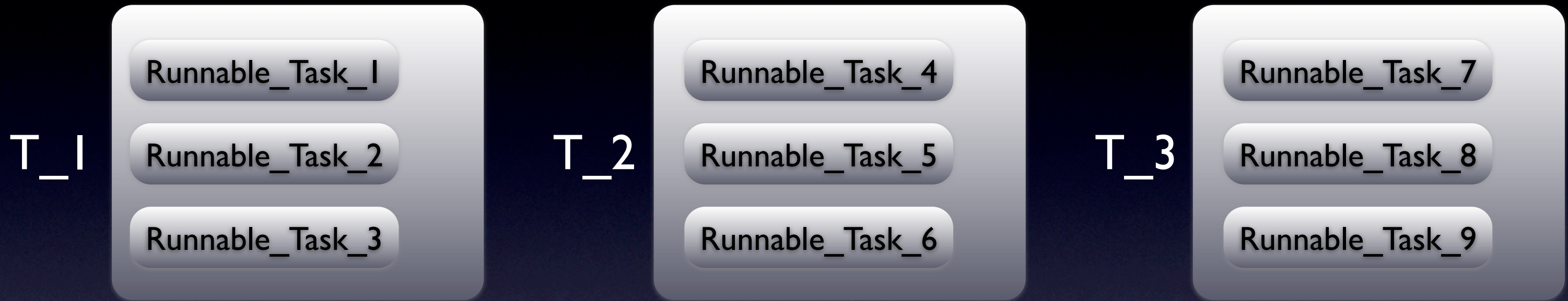
- Ability to use existing C-code
- Includes Alive Indication, Deadline processing
- Includes Runnable Task pre-condition for RT_n's, events, and data
- Trace logic flow of runnable tasks, faults
- Inject data structure faults or modify setup tables at specific times
- Use VisualSim Platform: Basic Blocks + Virtual_Machine

Electronic Control Units -- ECUs



- Virtual Bus (VB) can be CAN, FlexRay, etc.
- ECU's have pre-emptable Runnable Task Queues
- T_n's (Runnable Task groups) are assigned to ECU's.

Software Components -- T_n



Task_Table: Task, ECU, RT_Arr

Schedule_Table: Expiry, Name, ECU, Offset, Tasks

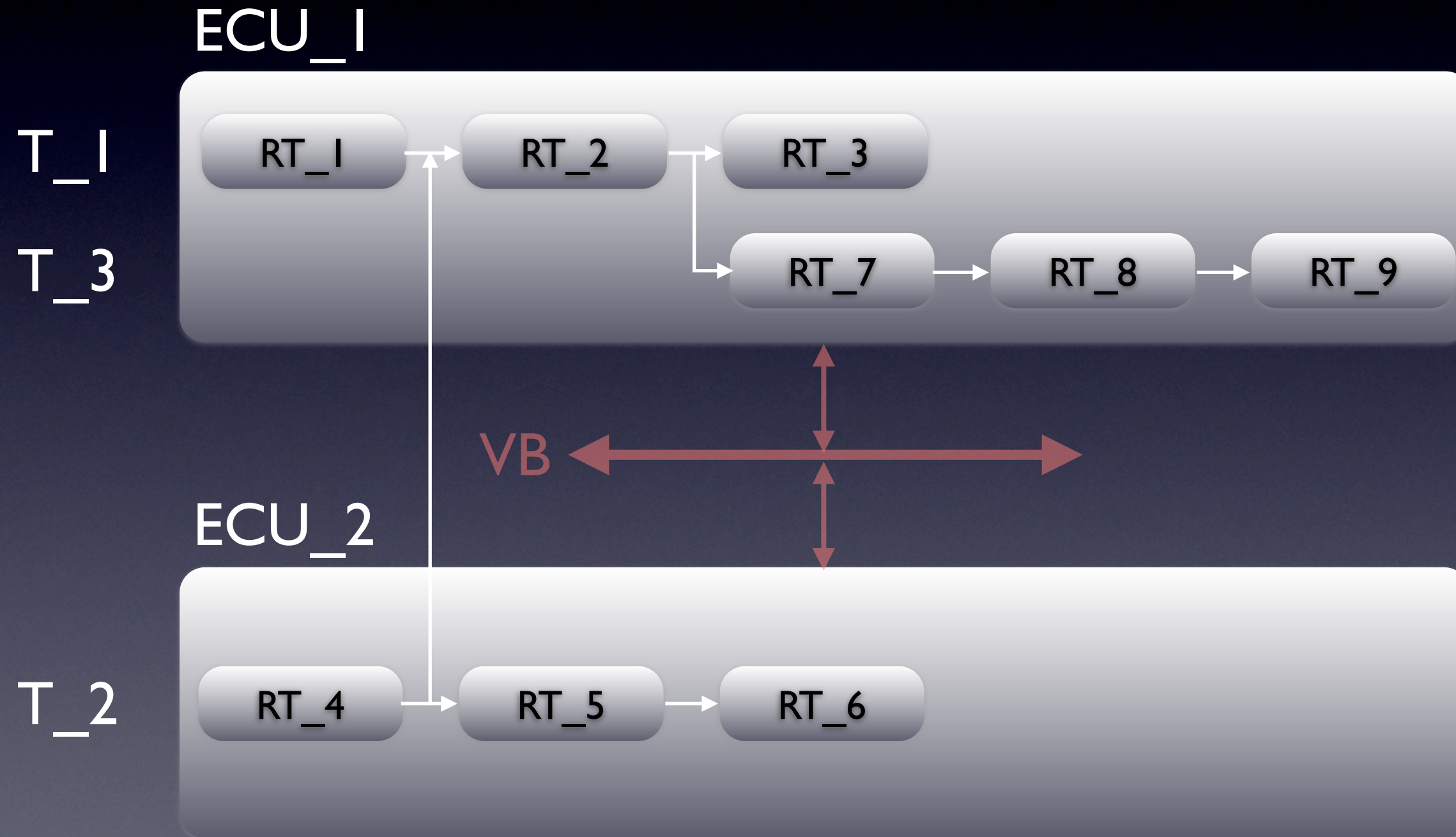
Set_Event_Table: ID, Runnable_Task, Priority, Time, Pre_Condition

Data_Table: ID, Data_Name, Data, Period

Alive_Supervisor: ID, Checkpoint, WdgMExpectedAliveIndications,
WdgMSupervisionReferenceCycle, WdgMSupervisionReferenceCycle,
WdgMMinMargin, WdgMMaxMargin

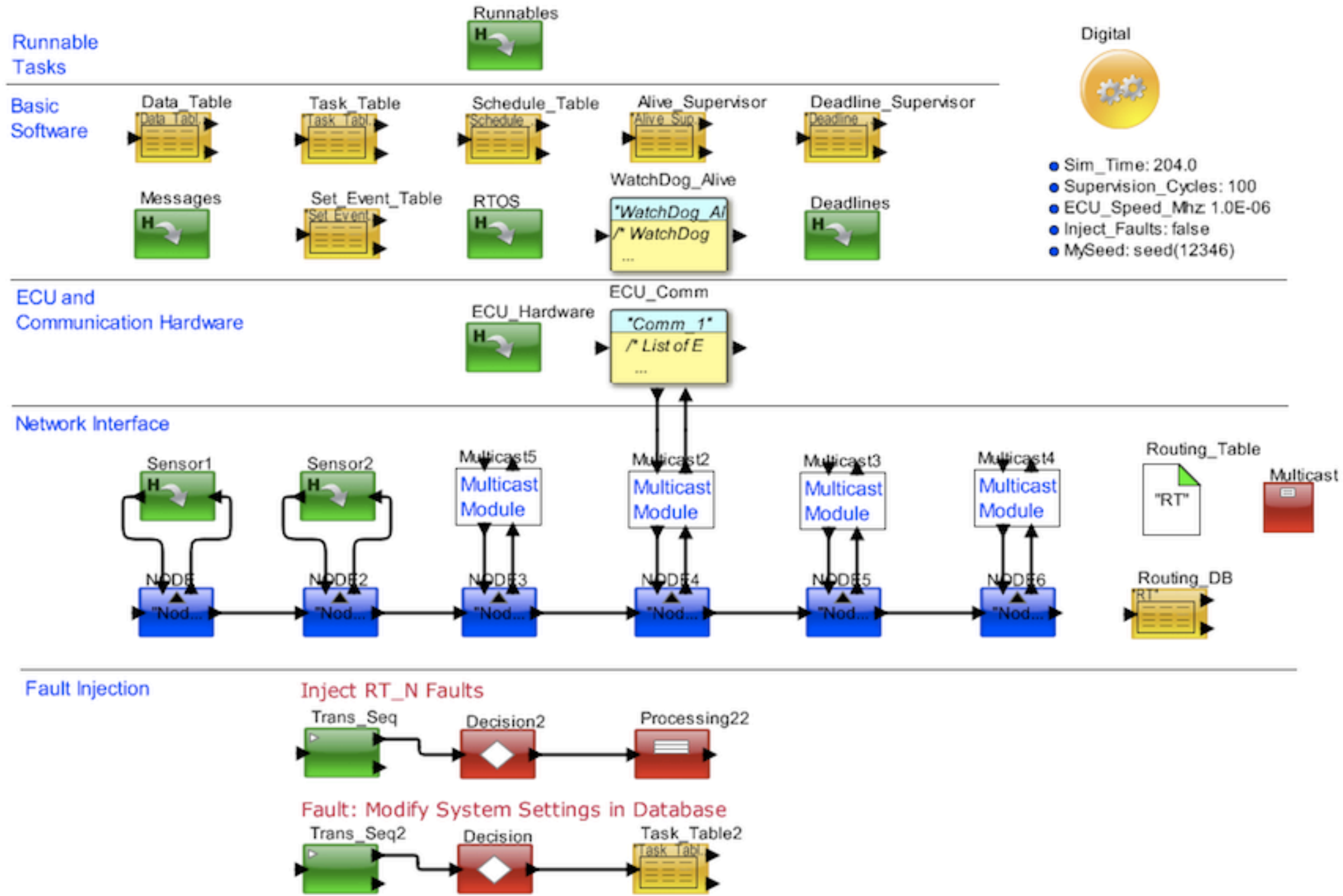
Deadline_Supervisor: ID, Deadline, CP_Start, CP_End, WdgMDeadlineMin,
WdgMDeadlineMax

Cooperative ECU, T_n Execution



AUTOSAR Model -- Next Side

Autosar: Configuring the Scheduler, Tasks, Runnables and the Watchdog



Schedule_Table, Task_Table

Edit parameters for Schedule_Table

Block_Documentation: Schedule Table
Identifies Expiry ID, Name, Offset timing, Task array

Linking_Name: "Schedule_Table"

Data_Structure_Text:

```
/* Schedule Table Template. */  
Expiry Name      Offset  Tasks      ;  
1    EP_1        5      {"T_1"}    ;  
2    EP_2        15     {"T_2"}    ;  
3    EP_3        30     {"T_3"}    ;
```

Input_Fields: "Name"

Lookup_Fields: "Name"

Output_Expression: "output = match" /* FORMAT output = match.fieldb */

Mode: Read

Commit Add Remove Preferences Help Cancel

Edit parameters for Task_Table

Block_Documentation: Task Table

Linking_Name: "Task_Table"

Data_Structure_Text:

```
/* Task Table Template */  
ID Task  ECU  RT_Arr      ;  
1 T_1    ECU_1 {"RT_1","RT_2","RT_3"} ;  
2 T_2    ECU_2 {"RT_4","RT_5","RT_6"} ;  
3 T_3    ECU_1 {"RT_7","RT_8","RT_9"} ;
```

Input_Fields: "Task"

Lookup_Fields: "Task"

Output_Expression: "output = match" /* FORMAT output = match.fieldb */

Mode: Read

Commit Add Remove Preferences Help Cancel

Set_Event_Table, Data_Table

Edit parameters for Set_Event_Table

Block_Documentation: Pre Condition is an array of:
RT_n (Runnable Tasks)
Event_n (Events)
Data_n (Data)

Linking_Name: "Set_Event_Table"

Data_Structure_Text: /* Expiry Point Template
First row contains Field Names. */
ID Runnable_Task Priority Time Pre_Condition ;
1 RT_1 0 1.0 {"Evt_1"} ;
2 RT_2 0 1.0 {"RT_1","RT_4"} ;
3 RT_3 0 1.0 {"RT_1","RT_2","Data_1"} ;
4 RT_4 0 2.0 {} ;
5 RT_5 0 2.0 {} ;
6 RT_6 0 2.0 {"Data_1"} ;
7 RT_7 0 3.0 {"RT_2"} ;

Input_Fields: "ID"

Lookup_Fields: "ID"

Output_Expression: "output = match" /* FORMAT output = match.fieldb */

Mode: Read

Commit Add Remove Preferences Help Cancel

Edit parameters for Data_Table

Block_Documentation: Data_Name, Data (sent)
Period is in SC cycles the data is updated.
First data sent after first Period SC cycles.
Data is valid thereafter.

Linking_Name: "Data_Table"

Data_Structure_Text: /* Expiry Point Template
First row contains Field Names. */
ID Data_Name Data Period ;
1 Data_1 0x00000001 40 ;
2 Data_2 0x0000000F 40 ;

Input_Fields: "ID"

Lookup_Fields: "ID"

Output_Expression: "output = match" /* FORMAT output = match.fieldb */

Mode: Read

Commit Add Remove Preferences Help Cancel

Alive_Supervisor, Deadline Supervisor

Edit parameters for Alive_Supervisor

Block_Documentation: Alive Supervisor

Linking_Name: "Alive_Supervisor"

Data_Structure_Text:

ID	Checkpoint	WdgMExpectedAliveIndications	WdgMSupervis
1	CP1.2	2	3
2	CP2.2	4	1
3	CP3.2	3	1
4	CP4.2	4	3
5	CP5.2	1	1
6	CP6.2	1	1
7	CP7.2	6	3
8	CP8.2	1	1

Input_Fields: "Checkpoint"

Lookup_Fields: "Checkpoint"

Output_Expression: "output = match" /* FORMAT output = match.fieldb */

Mode: Read

Commit Add Remove Preferences Help Cancel

Edit parameters for Deadline_Supervisor

Block_Documentation: Deadline Supervisor

Linking_Name: "Deadline_Supervisor"

Data_Structure_Text:

ID	Deadline	CP_Start	CP_End	WdgMDeadlineMin	WdgMDeadl
1	DL_1	"CP1.1"	"CP1.2"	4	5
2	DL_2	"CP2.1"	"CP2.2"	2	20
3	DL_3	"CP3.1"	"CP3.2"	2	20

Input_Fields: "Deadline"

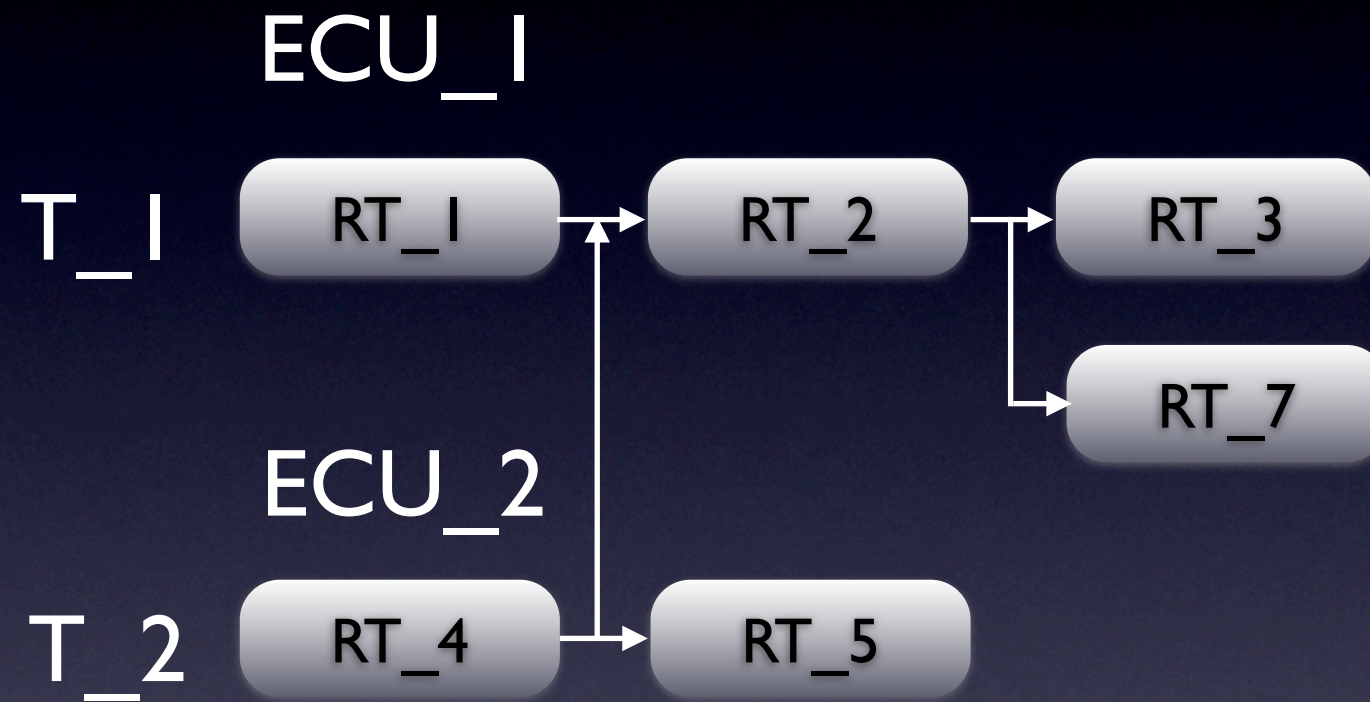
Lookup_Fields: "Deadline"

Output_Expression: "output = match" /* FORMAT output = match.fieldb */

Mode: Read

Commit Add Remove Preferences Help Cancel

Pre-Condition Processing



User Enters

ID	Runnable_Task	Priority	Time	Pre_Condition
1	RT_1	0	1.0	{"Evt_1"}
2	RT_2	0	1.0	{"RT_1","RT_4"}
3	RT_3	0	1.0	{"RT_2","Data_1"}
4	RT_4	0	2.0	{}
5	RT_5	0	2.0	{}
6	RT_7	0	3.0	{"RT_2"}

Model Creates

RT_or_Event	Triggers
Evt_1	{"RT_1"}
RT_1	{"RT_2"}
RT_2	{"RT_3","RT_7"}
RT_3	{}
RT_4	{"RT_2","RT_5"}
RT_5	{}
RT_7	{}

Summary

- WatchDog Manager can be modeled with VisualSim platform.
- WDM Alive Indications, Deadline can be processed.
- RT_n, Evt_n, Data_n pre-conditions can be processed.
- Multicore execution of RT_n can be added.
- Conversion of .xml configuration files can be added.