



**REAL TIME MULTI-TASKING
OPERATING SYSTEM**

Tuwa

Embedded Applications

Version 1.0

Tuwa Real Time operating system is designed for fulfilling the need of embedded applications where several processes in parallel have to be performed in 'Real-Time'. It is one of the few RTOS's available that was developed from ground up for performing highly efficient execution of Multi-tasks in Real-time. It offers an order magnitude performance improvement over traditional OS

It is a true 'Preemptive Priority Enforced Multitasking' Operating System.

The kernel is designed in assembly code for the fastest task context switching.

Tuwa RTOS has priority inversion option. An efficiently architected and tightly knit set of APIs make various critical tasks possible e.g. excellent inter-process messaging mechanism, resource control, Mutex Semaphores, Events, Pipes, Signals, Timers, File system.

The RTOS provides rich set of APIs to make embedded development much easier reducing development time by 70%

Key features:

- *Fast Multitasking kernel*
- *Priority levels*
- *Priority enforced*
- *Priority inversion*
- *Fast deterministic response to interrupts*
- *Message Queues*
- *Pipes*
- *Mail boxes*
- *Events*
- *Signals*
- *Mutex*
- *Semaphores*
- *File systems on RAM*
- *Tick Timers*

Summary list of APIs

- **TASK Management API**
- **Memory Management API**
- **Vector API**
- **Task Synchronization API**
- **Mutex**
- **Critical**
- **Semaphores**
- **Inter Process Communication (IPC)**
- **Pipes**
- **MailBox**
- **Event Management API**
- **Signal Management API**
- **RAM File System Management API**
- **Timer Management API**
- **TCP/IP Stack API**
- **File/System and Device I/O Management API**
- **Device Driver Management API**

Detailed list of APIs:

TASK Management API

- *LoadTask*
- *LoadBackgroundTask*
- *Suspend*
- *Sleep*
- *TaskDelay*
- *GetCurrentTaskId*
- *ExitTask*
- *KillTask*
- *FindTask*
- *GetTaskId*
- *TaskLoaded*
- *InvertTaskPriority*

Memory Management API

- *AllocMem*
- *AllocMemFirstFit*
- *FreeMem*
- *FreeMemPtr*
- *MemPtr*

Vector API

- *SetVector*
- *GetVector*

Task Synchronization API

- *Critical*
- *EnterCritical*

- *ExitCritical*

Mutex

- *CreateMutex*
- *DeleteMutex*
- *WaitForMutex*
- *ReleaseMutex*

Semaphores

- *CreateSemaphore*
- *DeleteSemaphore*
- *WaitForSemaphore*
- *ReleaseSemaphore*
- *LockSemaphore*
- *UnLockSemaphore*

Intra Process Communication (IPC)

- MessageQueue
- *CreateMessageQueue*
- *DeleteMessageQueue*
- *GetMessageQueueSize*
- *GetMessageQueueElementSize*
- *GetTransmitFailureCount*
- *ReceiveMessage*
- *TransmitMessage*
- *TransmitMessageFromISR*

Pipes

- *CreatePipe*
- *DeletePipe*
- *FlushPipe*
- *GetPipeSize*
- *GetPipeElementSize*

- *ReadPipe*
- *WritePipe*
- *WritePipeFromISR*
- *GetWritePipeFailureCount*

MailBox

- *GetMailBoxCapacity*
- *GetMailMsgSize*
- *CreateMailBox*
- *CreateMailBuffer*
- *FreeMailBuffer*
- *GetMailCount*
- *MailBufPtr*
- *MailBufSize*
- *DeleteMailBox*
- *ReceiveMail*
- *SendMail*
- *SendMailFromISR*
- *GetSendMailFailureCount*

Event Management API

- *CreateEvent*
- *DeleteEvent*
- *WaitForEvent*
- *SetEvent*
- *SetEventFromISR*
- *ClearEvent*

Signal Management API

- *EndOfSignal*
- *SendSignal*
- *SignalGetVector*
- *SignalSetVector*
- *SignalMask*
- *SignalUnMask*
- *SignalMaskAll*
- *SignalUnMaskAll*
- *SignalClearInservice*
- *SignalClearInserviceAll*

RAM File System Management API

- *OpenRamFile*
- *RamFileDriver*
- *WriteRamFile*
- *ReadRamFile*
- *SeekRamFile*
- *EofRamFile*
- *CloseRamFile*
- *SetRamFileSize*
- *ClearRamFile*
- *TruncRamFile*

Timer Management API

- *CreateTimer*
- *DeleteTimer*
- *StartTimer*
- *StopTimer*

TCP/IP Stack API

- *Socket*
- *Connect*
- *Accept*
- *Recv*
- *Send*
- *Listen*
- *Select*
- *Ioctl*
- *Sendto*
- *RecvFrom*
- *Close*

File/System and Device I/O Management API

- *Create*
- *Open*
- *Close*
- *Read*
- *Write*
- *Fopen*
- *Fread*
- *Fwrite*
- *Fclose*
- *Fflush*
- *Seek*
- *Ftell*

Device Driver Management API

- *MakeDev*
- *MakeNode*
- *AddDevice*
- *RemoveDevice*

ADDITIONAL OPTIONAL MODULES

- 1 InternetSQL ANSI SQL Embedded RDBMS
- 2 TuwaWindows, A fully featured Windows Systems for Embedded LCD display