



# **Concepts et Pratique des Processeurs Numériques des Signaux (DSP)**

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## Mise en évidence de:

- Fonctionnalités de base des processeurs numériques des signaux (DSP)
- Architectures des cores et des périphériques des DSPs
- Méthodologies et Outils de développement, de vérification et de mise au point

## Compétences à acquérir:

- Maîtrise des architectures matérielles des DSPs
- Maîtrise du jeu d'instructions pour la programmation des DSP
- Spécification des applications d'implantation sur DSP
- Règles de structuration et de développement de codes DSP
- Maîtrise des outils de développement et de test des applications DSP

# Programme du module



Séance 1	<i>Concepts de base des DSP: définition et architecture générique</i>	C. Rebai
Séance 2	<i>Étude des DSP AD-Blackfin: architecture et jeu d'instructions</i>	C. Rebai
Séance 3	<i>Initiation à l'environnement de développement intégré Visual DSP++</i>	C. Rebai
Séance 4	<i>Application 1: Familiarisation avec le jeu d'instructions du DSP Blackfin</i>	C. Rebai M. Attia
Séance 5	<i>Application 2: Implantation d'un filtre à réponse impulsionnelle finie (FIR)</i>	C. Rebai M. Attia
Séance 6	<i>Application 3: Chargement des porteuses d'un modulateur DMT</i>	C. Rebai M. Attia
Séance 7	<i>Application 4: Fonctions de traitement d'images</i>	C. Rebai M. Attia



## *Partie 3*

# **Initiation à l'environnement de développement intégré: Visual DSP++**

- Fonctionnalités du VisualDSP++
- Manipulation des projets
- Application assistée de création de projet



## Fonctionnalités du VisualDSP++





VisualDSP++ est un environnement de développement intégré permettant une gestion efficace des projets.

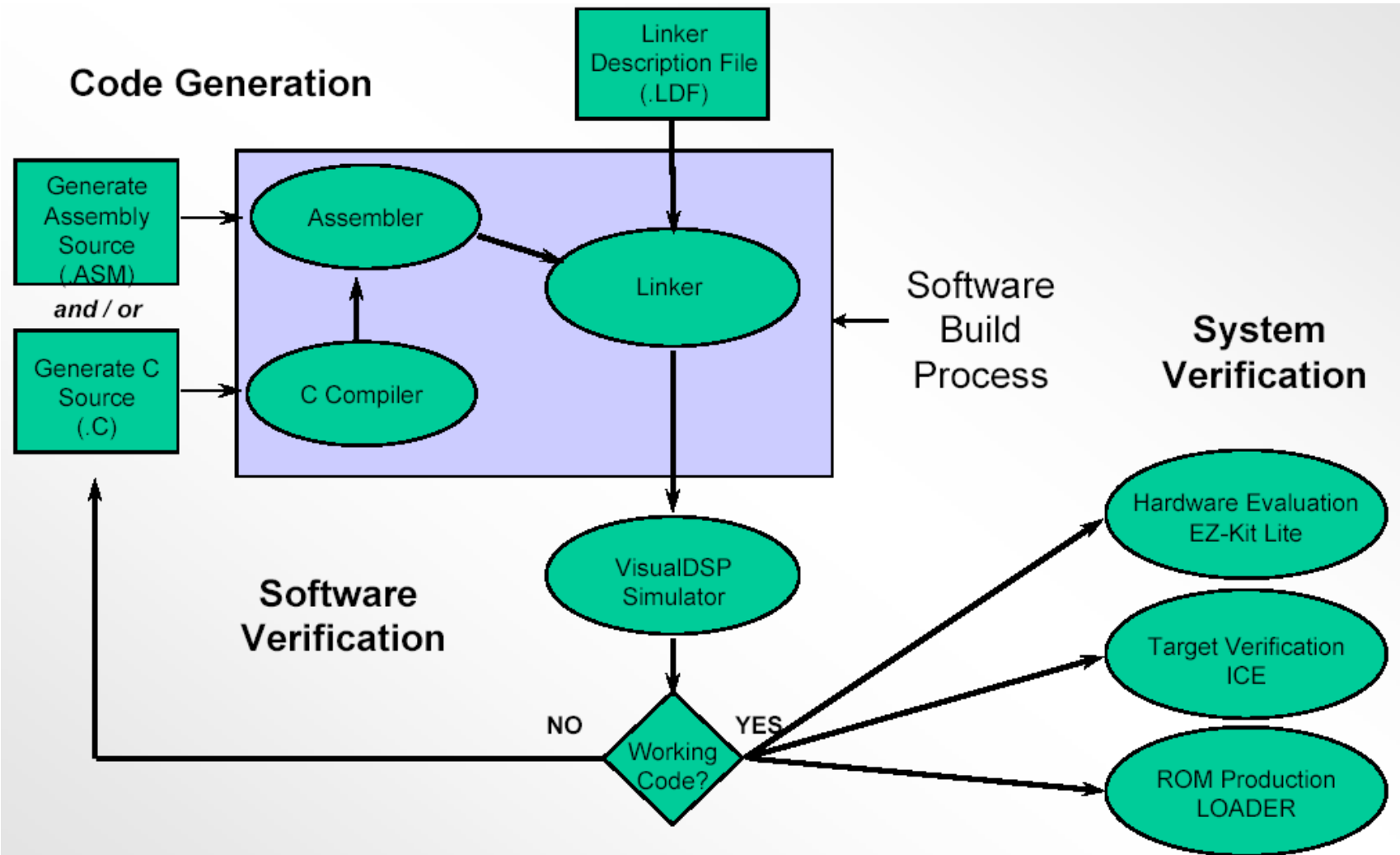
## Principales fonctionnalités

- **Editing**
- **Building**
  - **Compiler, assembler, linker**
- **Debugging**
  - **Simulation, Emulation, EZ-KIT**
  - **Run, Step, Halt**
  - **Breakpoints, Watchpoints**
  - **Advanced plotting and profiling capabilities**
  - **Pipeline and cache viewers**



- **Integrated Development and Debugger Environment (IDDE)**
  - Multiple workspaces, projects, project groups
- **Project Wizard**
  - Create/configure a DSP project
- **High level language support including C and C++**
- **Expert Linker**
  - Graphical support for managing linker description files
  - Code profiling support
- **Easy to use Online Help**
- **BTC (Background Telemetry Channel) Support**
  - Data Streaming and Logging
- **Easy to test and verify applications with scripts (TCL, VB, Java)**
- **VisualDSP++ RTOS/Kernel/Scheduler (VDK)**
- **Integrated Source Code Control**
- **Device Drivers and System Services**

# Étapes de développement logiciel







- **IDDE allows one to manage the project build**
- **The user configures the project and the development tools via property pages**
- **Project Property pages configure the project**
  - Project Property Page
  - General Property Page
  - Pre Build Property Page
  - Post Build Property Page
- **Development Tools Property Pages are used to configure the development tools**
  - Assembler Property Page
  - Compiler Property Page
  - Linker Property Page
  - Loader Property Page



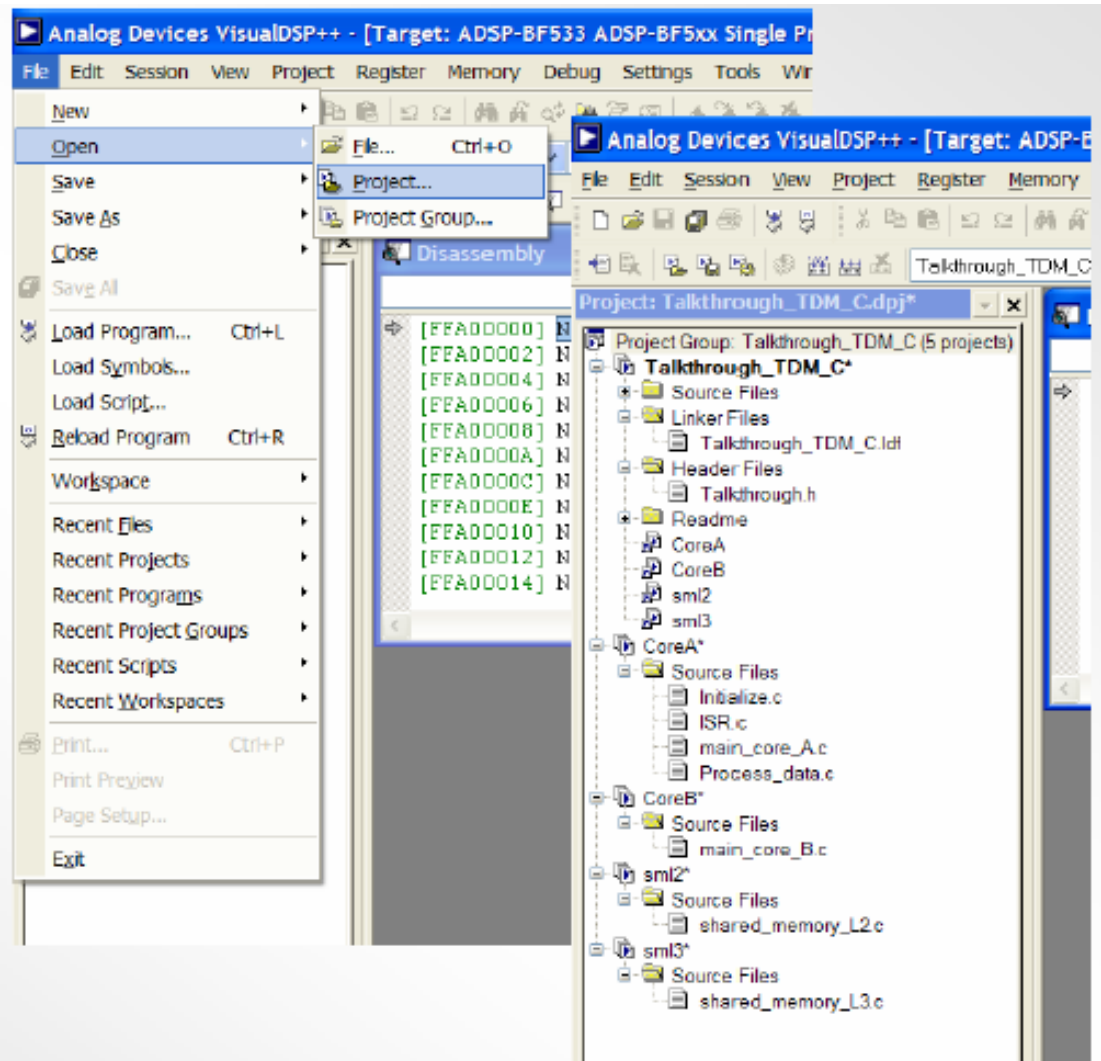
## Manipulation des projets



# Création de projet



- **Create a project**
  - All development in VisualDSP++ occurs within a project.
  - The project file (.DPJ) stores your program's build information: source files list and development tools option settings
  - A project group file (.DPG) contains a list of projects that make up an application (eg ADSP-BF561 dual core application)

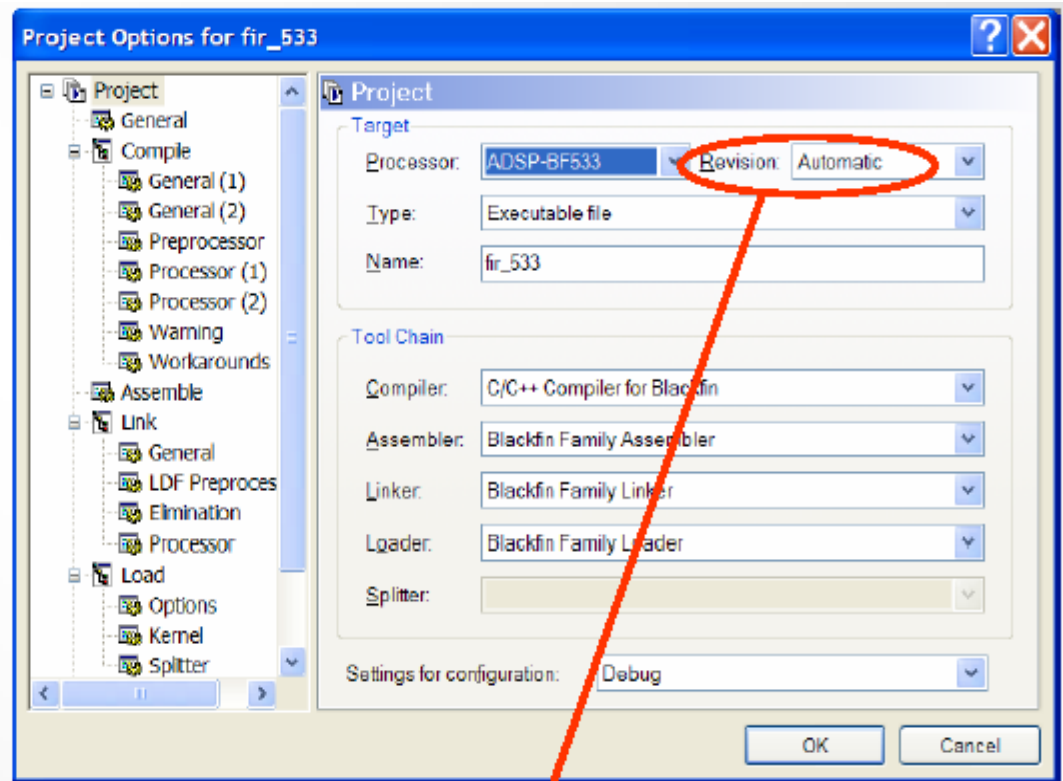


# Property page - Projet



## Configure project options

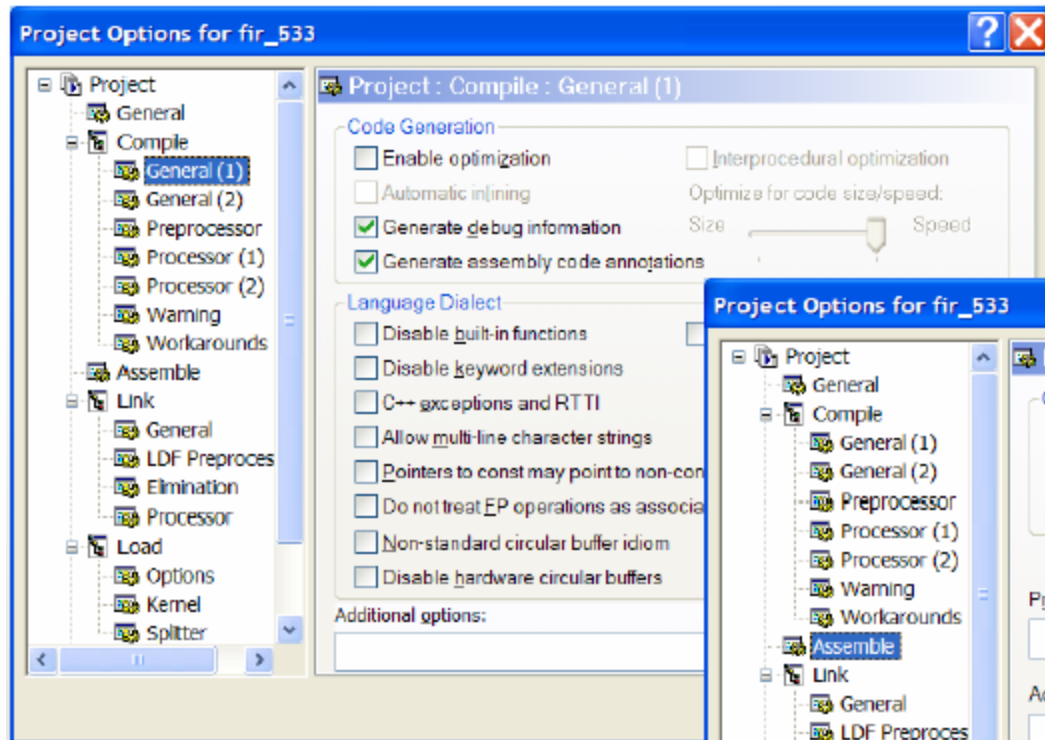
- Define the target processor and set up your project options (or accept default settings) before adding files to the project.
- The Project Options dialog box provides access to project options, which enable the corresponding build tools to process the project's files correctly



Enable building for a specific revision of silicon

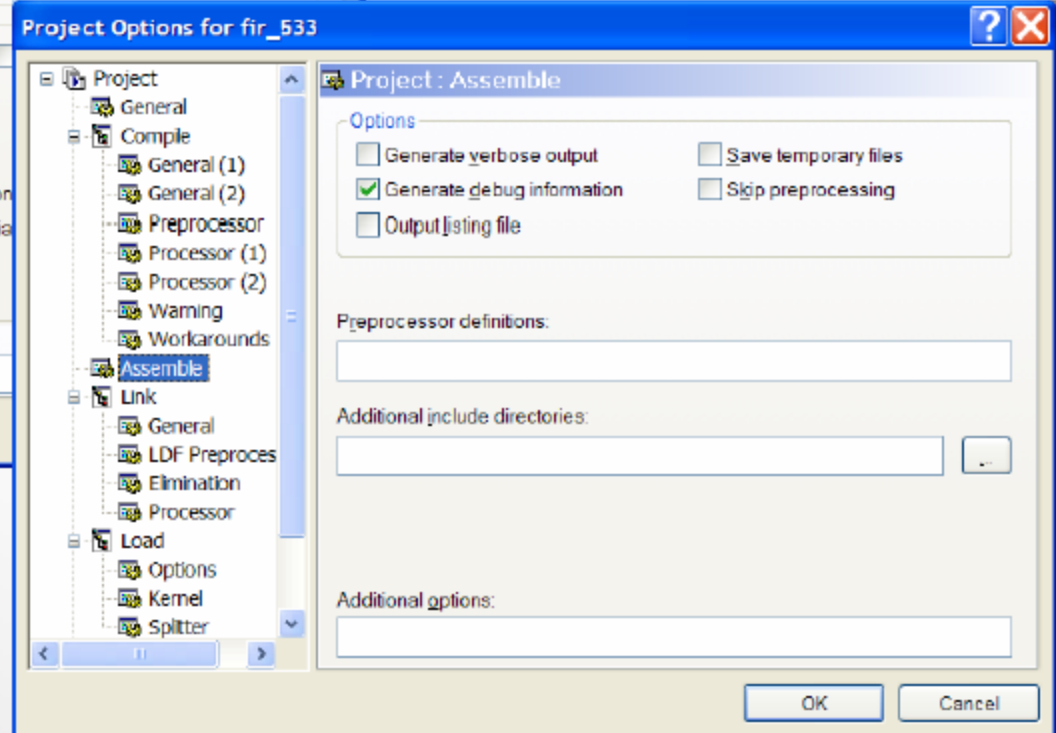
- No need to specify '-si-revision' switch
- Automatic will attempt to determine revision of the attached target
- or specify a specific rev level (eg 0.3)

# Property page - Compilers



Assembler Property Page

C/C++ Compiler Property Page



# Property page – Linker, Loader



**Project Options for fir\_533**

**Project : Link : General**

Options

- ☐ Generate object trace
- ☐ Strip debug symbols
- ☐ Strip all symbols
- ☐ Warn once on undefined symbol

Runtime initialization: None

Additional Output

- ☐ Generate symbol map
- ☐ Generate .gref
- ☐ Save temporary files

Search directories:

Additional options:

**Project Options for fir\_533**

**Project : Load : Options**

Boot Mode

- ☒ Flash/PROM
- ☐ UART
- ☐ SPI
- ☐ SPI Slave
- ☐ TWI

Boot Format

- ☒ Intel hex
- ☐ ASCII
- ☐ Binary

Output Width

- ☒ 8-bit
- ☐ 16-bit

Wait state: Baud rate: Hold time: Programmable flag:

☒ Use default start address

Start address: 0x0

☐ Verbose

Initialization file:

...

Output file:

...

Additional options:

OK Cancel

**Loader Property Page**

# Property pages – Build



Project Options for fir\_533

Project : General

Output Directories:

Intermediate file: \Debug

Output files: \Debug

General Property Page

Project Options for fir\_533

Project : Pre-build

Pre-build description:

Pre Build Property Page

Project Options for fir\_533

Project : Post-build

Post-build description:

Post-build command(s):

Post Build Property Page

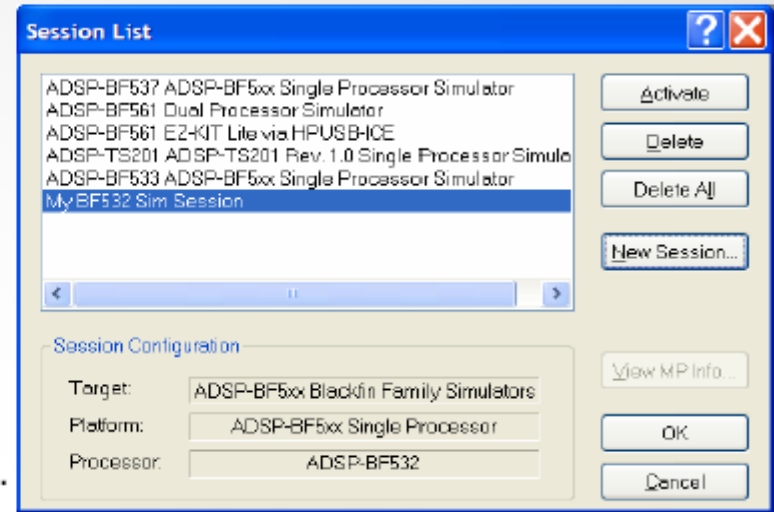
OK Cancel



# VisualDSP++ Sessions

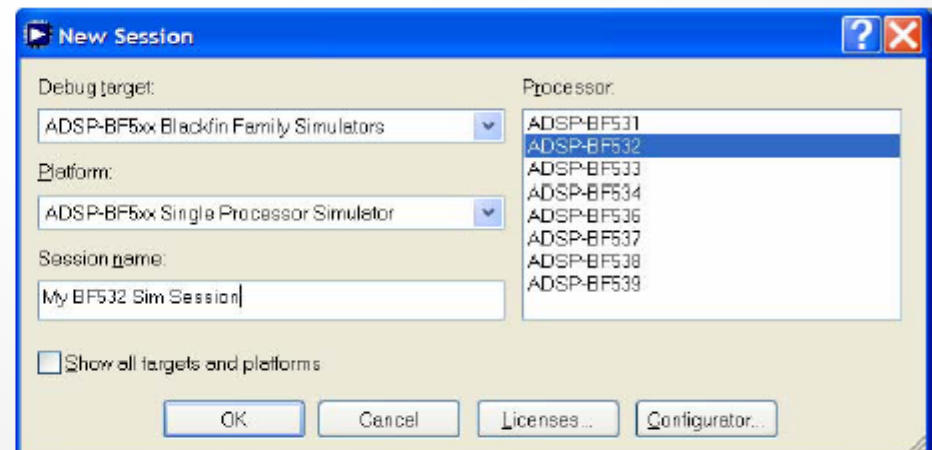


- Sessions define Debug Environments
- Select Sessions pull down menu
  - Choose Sessions List
  - Select Session to activate
- Define New Session from Session List
  - Select New Session
  - Configure session as required e.g.



Debug target : ADSP-BF53x Family Simulator  
Platform : ADSP-BF53x Single Processor Simulator  
Session name : ADSP-BF533 ADSP-BF53x Single Processor Simulator

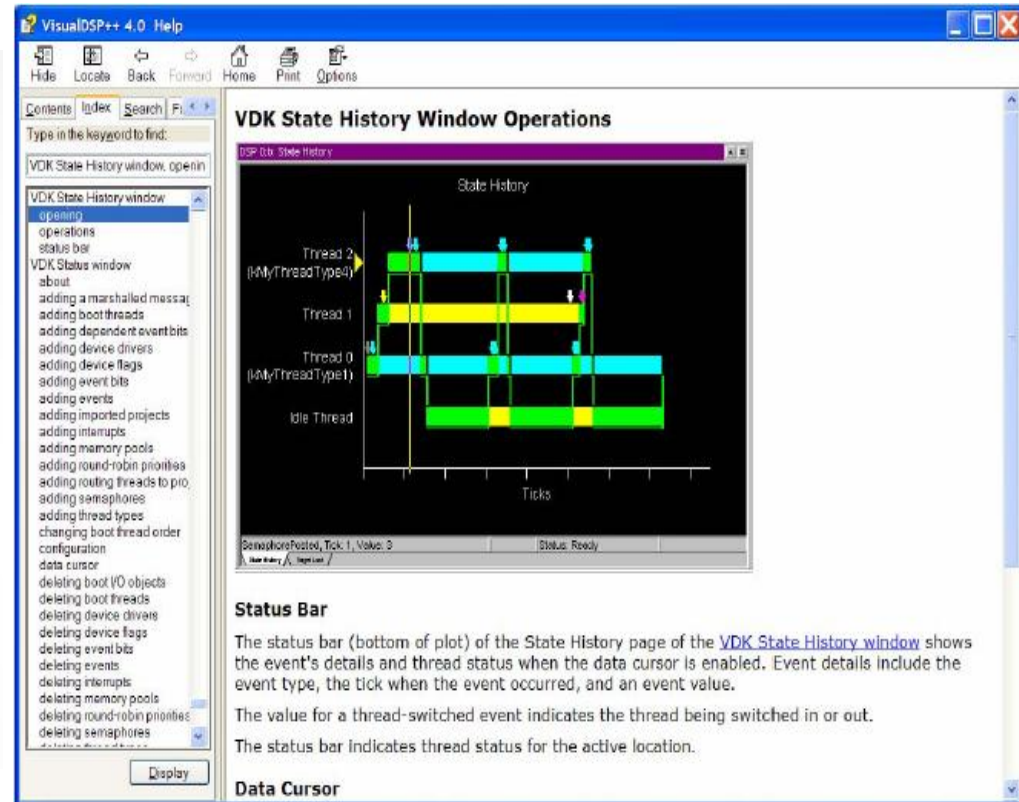
- Click OK
  - Session name will appear in Session List
- Click Activate
  - IDDE session will open







- Single Step
- Run
- Halt
- Set Breakpoints
- Register Viewing
- Memory
  - Viewing
  - Plotting
  - Dump/Fill
- Code Optimization Utilities
  - Profiling
  - Pipeline Viewer
  - Cache Viewer
- Compiled Simulation
- High Level Language debug support
  - Mixed mode





## Application assistée de création de projet



*Activités pratiques en laboratoire*



***Fin  
de la 3<sup>ème</sup> partie...***