Automated code generation for Early AURIX™ VP

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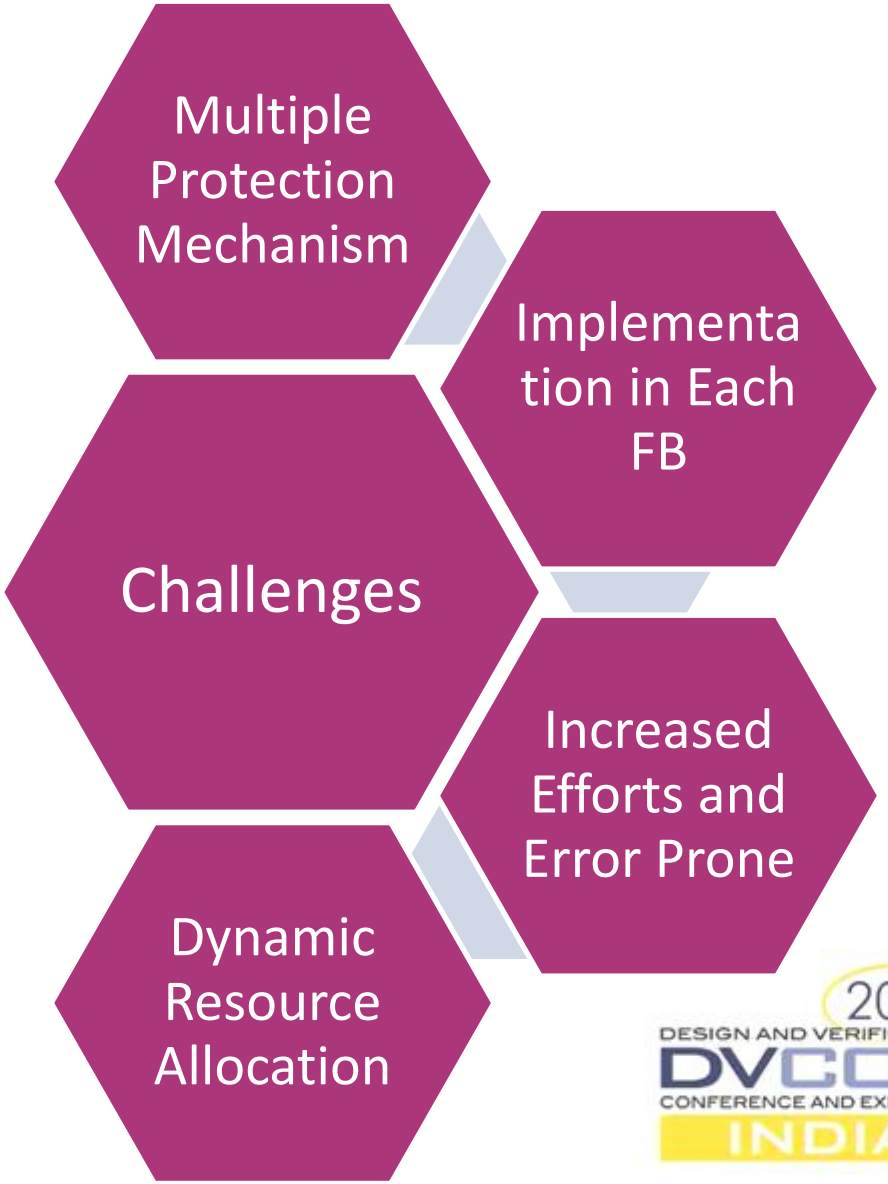
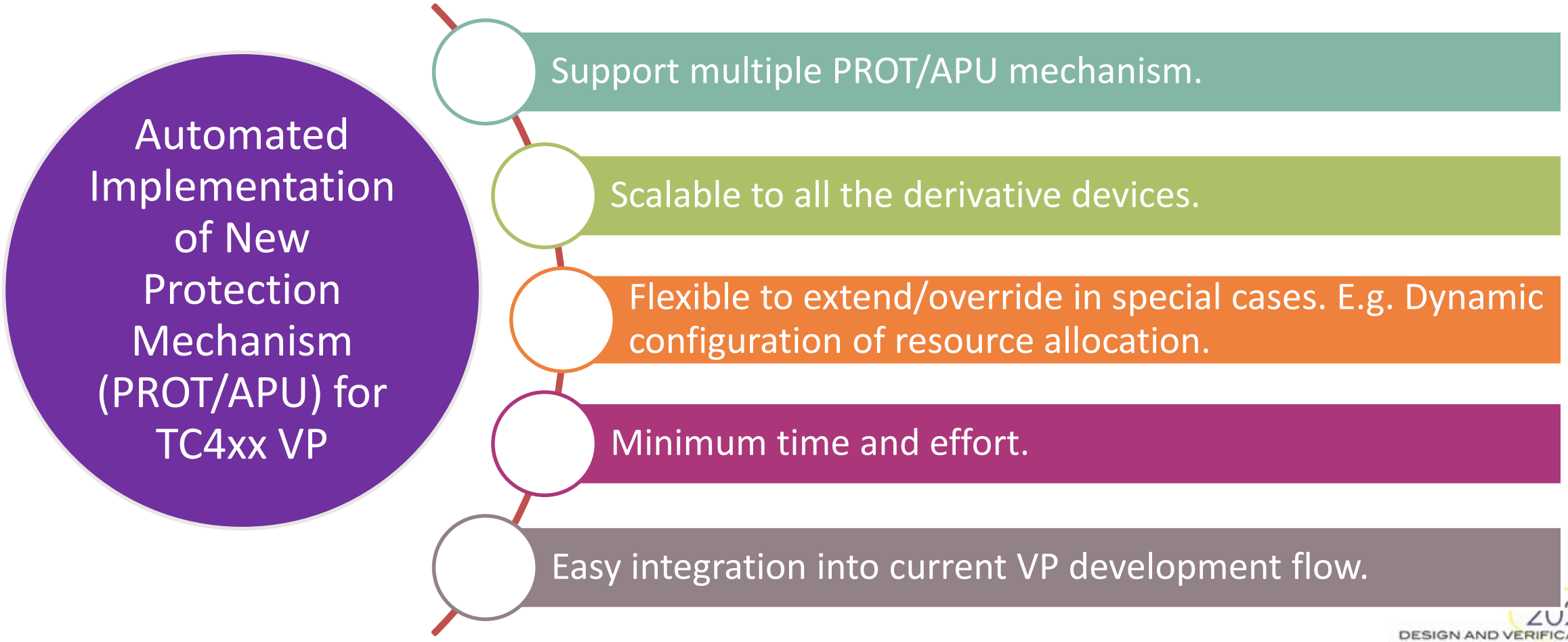
2021 DESIGN AND VERIFICATION™ DVCON CONFERENCE AND EXHIBITION INDIA

Introduction

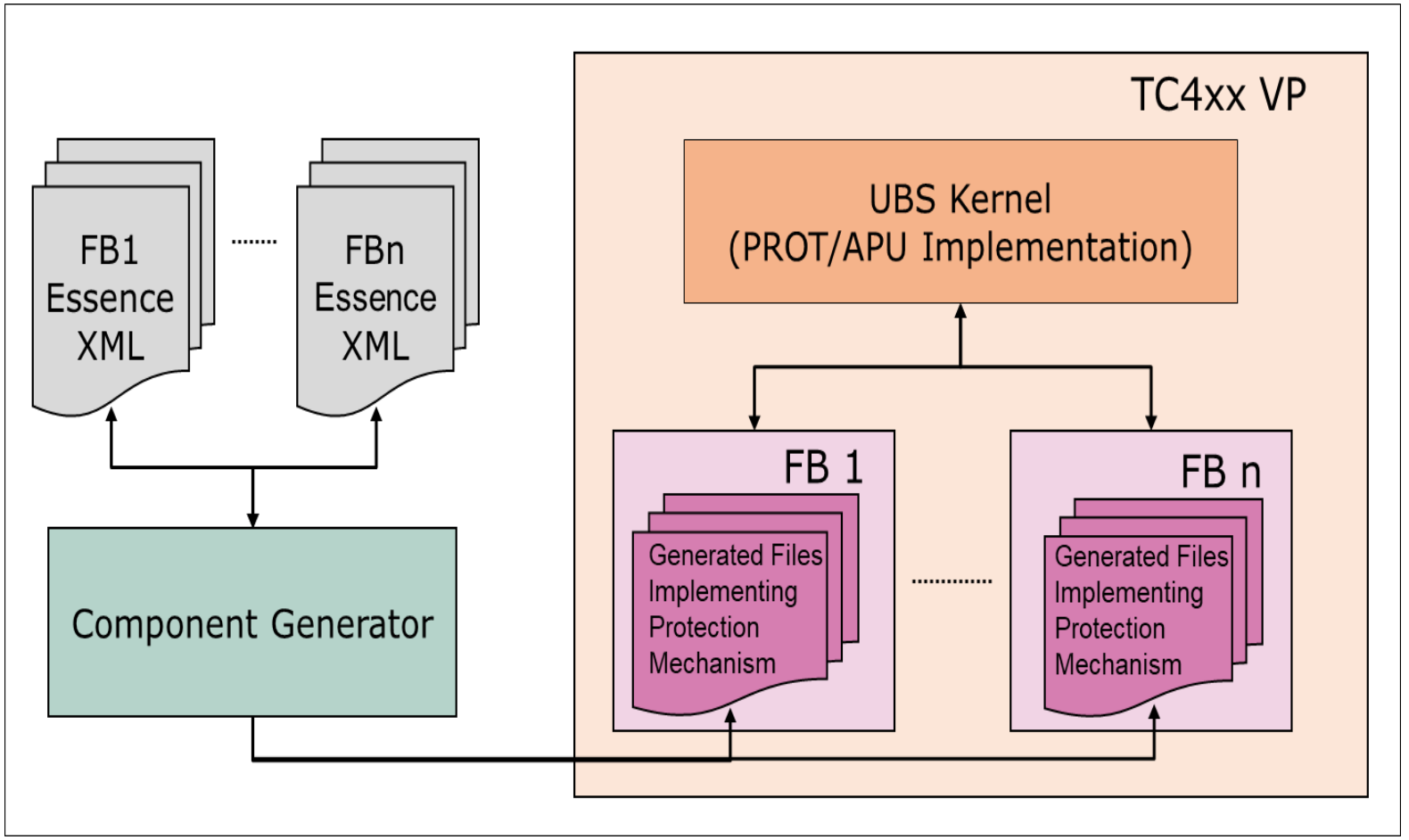
- Virtual Prototype (VP) - Shift left platform expected to be available quite early in SoC development cycle.
- With the new architectural enhancements, protection mechanism is an essential feature of the next generation AURIX™ safety and security architecture.
- Enables application software to restrict read and write accesses to each slave function to a desired set of masters.
- In addition it supports CPU hypervisor functions with access protection control based on Virtual Machine ID.



Advantages



Implementation Details



Centralized implementation of UBS provides protection mechanism API's.

Easy integration to the existing development flow.

Generated protection check files

Centralized implementation of PROT/APU

Implementation Details

Functions Implementing Protection Mechanism

```
bool checkAccessProtocol_RegX(UbsKernel)
{
    UbsKernel->isValidMasterSatisfied(ID_X)
    UbsKernel->isPROTSatisfied(REG_X)
    UbsKernel->checkAccess();
}

bool checkAccessProtocol_RegX1(UbsKernel)
                ...
bool checkAccessProtocol_RegX2(UbsKernel)
```

API's Provided by UBS Kernel

```
bool isValidMasterSatisfied();

bool isPROTSatisfied();
        ...
bool checkAccess();
```

Automatic generation of protection check functions at each resource level(Registers, memory).

Generated protection check functions, uses the API's provided by the Centralized implementation.

Flexible as the API's can be used to extend the implementation. E.g. Dynamic configuration of resource allocation.

Results Table

Activity	Sub activity	No of days	Total days	Final effort (days)
Implementation	Spec study Development Reviews	4	4 * 41 = 164	164
Testing	Spec study Test case development Reviews	4	4 * 41 = 164	164
XML Refresh	XML Migration	10%	131(4 * [10 % of 328])	131
Bugs Found in the concept		10 bugs	10 days (Feed back to concept)	10
Deployment	Initial issues	1	41	-41
Code generator development	Spec study Scripting Verification	60	60	-60
Total Effort saved				**369**

Conclusion

Automation resulted in significant development cost saving:

- Significant development cost (approximately 369 man days) was saved because of the automation process.
- In addition it will also help in reducing the time and effort for development of other derivative VP of the same family.

Early feedback to the concept on the new protection mechanisms and also on the correctness of single source XML

Questions