

Middleware and dependability? Opportunities... and challenges.



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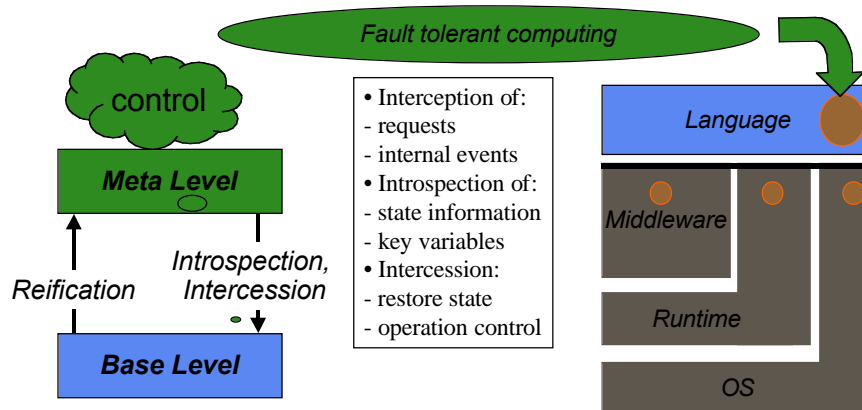
EDCC-4 – *Panel on Novel Approaches for Dependable Computing*

S.W.O.T...

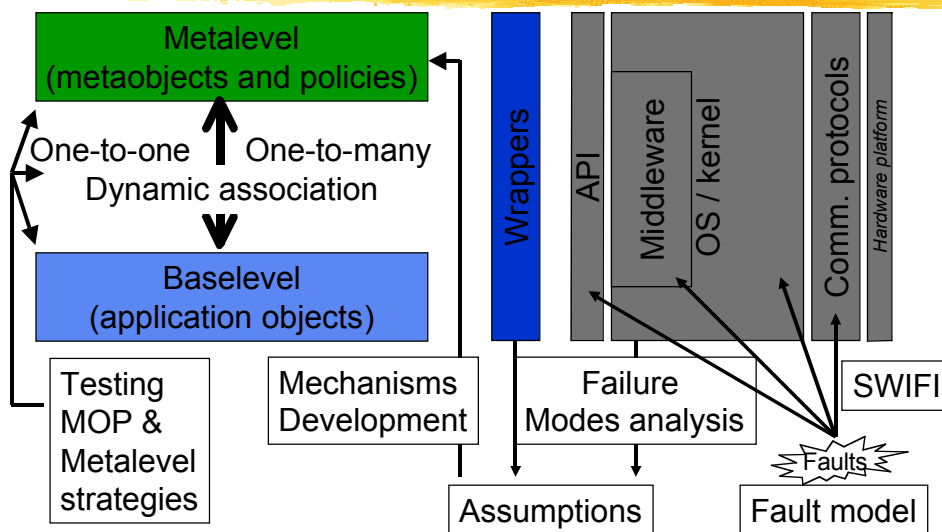
- **Strength**
 - Middleware is a software platform where common functional (application domain) services and non-functional mechanisms can be implemented, whatever the underlying HW/OS are.
- **Weaknesses**
 - Middleware is a group of often « black-box » software components that are executed by the OS and there are many possible sources of faults that can impact its behavior.
- **Opportunities**
 - Recent advances in reflective technology provide disciplined construction frameworks that make visible useful information to control/adjust application behavior in the presence of faults .
- **Threats**
 - Openness is an attractive concept... but subject to inconsistent modifications / customization actions...

Recent advance in architectures

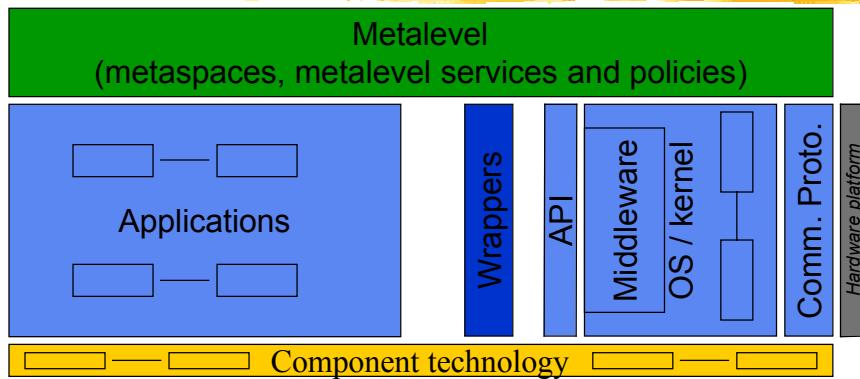
Principle of reflective frameworks



Design philosophy... in OO systems!



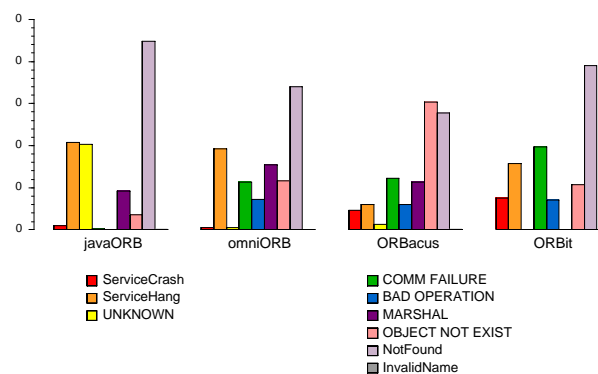
Design philosophy... in the future!



- Several metamodels to monitor and control base level activity
- Among metamodels (resources, scheduling, synchro, protocols, etc.)
- Metalevel services : FT strategies and runtime support for wrappers

Failure modes characterization

Targeting COTS middleware by fault injection



Challenges



- Adaptive fault tolerance
 - Evolution of fault assumptions due to operational / configuration / environment changes
 - Changing FT strategies on the fly (synchronization and consistency)
 - Composition of non-functional mechanisms on the fly (idem)
 - Wrapping technology for adaptive dependability
- Reflective frameworks
 - Making structural and behavioral internals visible (OS/Mdw)
 - Providing means to adjust the above according to the needs
 - Ensuring consistency with respect to customization

■ Some significant research already carried out in academia, and... some initial move to industry, yet...