Implementing the distributed features of Ada 9X with PVM

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Contents

Ada 9x

- Ada 83 revisited to incorporate the state-of-the art
- Ada 9X = Ada 83 + software engineering + OO + RT + DS ...
- Is to be normalized next year

GNAT

- Part of the effort to promote Ada 9x
- Developed at New York University
- A free Ada compiler linked to GCC and the FSF
- A high quality compiler for a wide range of platforms

Ada 9x and distributed systems

- Ada 83 proposes no solution
- Ada 9X proposes a normalized approach
- Two paradigms : RPC and shared variables
- Maintains the strong type model and application consistency
- A distributed program consists of compilation units and partitions

Ada 9x and distributed systems

- Distribution is introduced without any new syntactic constructor
- If a compilation unit plays a specific role, it is categorized
- The communication interface is language defined : System.RPC
- Distribution of program chunks is implementation dependent
- The Ada 9x RM defines what an implementation must offer to be conforming but one is free to add extra features.

The RPC paradigm

- A package is categorized with Remote Call Interface
- A RCI package provides services to the partitions : specification of the subprograms which can be called from remote
- Calling a remote service is just calling a subprogram
- Powerful mechanisms are remote dispatching and dynamic references to subprograms
- A RCI package must verify some restrictions

The Shared memory

- A package is categorized as Shared Passive
- Standard read / write operation even to the shared memory
- The package is to be associated to a storage element
- Weak consistency or strong consistency of the shared memory
- Some restrictions do exist

Our implementation criteria

- Modularity and clear interfaces
- Portability
- Low impact on the GNAT system

Why mixing GNAT, PVM and Ada 9X

- PVM is a mature technology and its targets are wide
- PVM can be used as a foundation
- We need an Ada 9X interface to PVM
- PVM deals with low level features and offer powerful primitives
- We want to test our approach for distributed Ada 9X as quickly as possible

Used PVM primitives

- Configuration of the virtual machine
- Launching new partitions
- Localizing RCI servers
- Partitions communication

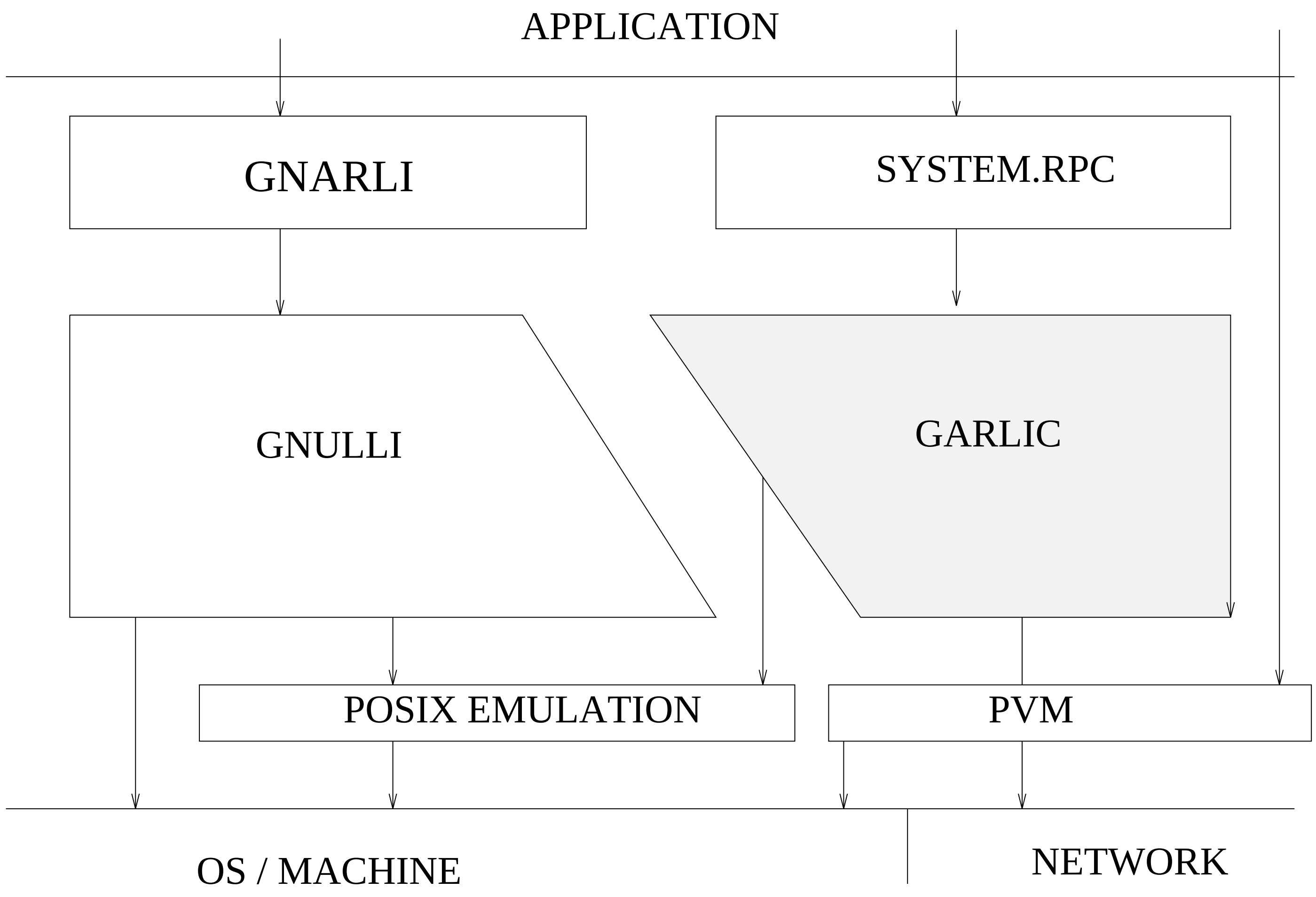

Figure 1: Our system architecture

Ada 9X and PVM : it can be troublesome

- The type issue of Ada 9X and the way to marshall / unmarshall the data
- The tasking issues of Ada 9X which lead to dangerous situations
- PVM and GNAT use both the same signals

Conclusions

- We have experimented the distributed features of Ada 9X
- The current architecture has been implemented quickly thanks to PVM
- A "classical" mandelbrot demo has been produced
- This experiment helps us to specify our approach more clearly

Perspectives and work in progress

- The front-end issues : by NYU
- The communication architecture has to be efficient : TAMU and ourselves.
- Implementing the virtual shared memory and the Linda approach

The will to get a full implementation of the distributed features of Ada 9X