Using Global View Resilience (GVR) to add Resilience to Exascale Applications

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GVR Project: http://gvr.cs.uchicago.edu

Motivation
- Current high performance systems base achieved 1P FLOPS and programs towards 1T FLOPS.
- The execution environment leads to higher error rates. It's anticipated that the time taken between failures [1,2] could be less than an hour [3].
- Resilience becomes a major issue.
- Need for a new tool which addresses resilience issues.

Global View Resilience
- A new library that exploits the global view data, and adds reliability to globally visible data [2,3].

• Portable, controllable resilience
- Having multiple versions is useful in many ways, e.g. rollback to old versions under presence of latent errors
- GVR array can preserve multiple versions upon application's request
- Enables error handling in line to handle various classes of errors, hence the effort spent for writing error handlers.

• Forwards Error Recovery and Handling
- Various errors have different sources (e.g. HW, SW, networking, application) and get into the GVR library once departed in an error producer (without any specific error handling such as rollback). GVR provides a major advantage in terms of simplicity of the error handling. GVR could be considered as a simple and efficient solution to error handling.

• Framework for Flexible Cross-layer Error Handling
- Error handling with error-based and error-tolerant approaches. For GVR, allowing global migration to existing applications, or as a treadmill of other libraries (programming models).

Open Resilience
- Creating Global View structures
- GVR stores error data, GVR versioning
- Global View of Actuals
- Data: GDS_put, GDS_get (error data)
- Consistency: GDS_initial, GDS_final, GDS_move_to_newest,
- Consistency: GDS_final, GDS_move_to_newest,
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