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How To Handle 6GBytes a Night and Not Get Swamped

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The Macho Project has undertaken a 5 year effort to search for dark matter in the halo of the Galaxy by scanning the Magellanic Clouds for micro-lensing events. Each evening's raw image data will be reduced in real-time into the observed stars' photometric measurements. The actual search for micro-lensing events will be a post-processing operation.

The theoretical prediction of the rate of such events necessitates the collection of a large number of repeated exposures. The Project designed camera subsystem delivers 64 Mbytes per exposure with exposures typically occurring every 500 seconds. An ideal evening's observing will provide 6 Gbytes of raw image data and 40 Mbytes of reduced photometric measurements. Recognizing the difficulty of digging out from a snowballing cascade of raw data, the Project requires the real-time reduction of each evening's data. The software team's implementation strategy centered on this non-negotiable mandate.

Accepting the reality that 2 full time people needed to implement the core real-time control and data management system within 6 months, off-the-shelf vendor components were explored to provide quick solutions to the classic needs for file management, data management, and process control. Where vendor solutions were lacking, state-of-the-art models were used for hand tailored subsystems. In particular, petri nets manage process control, memory mapped bulletin boards provide interprocess communication between the multi-tasked processes, and C++ class libraries provide memory mapped, disk resident databases.

The differences between the implementation strategy and the final implementation reality will be presented. The necessity of validating vendor product claims will be explored. Both the successful and hindsight decisions enabling the collection and processing of the nightly data barrage will be reviewed.