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The Keck Task Library (KTL)

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KTL is a set of routines which eases the job of writing applications which must interact with a variety of underlying sub-systems (known as *services*). A typical such application is an X Window user interface coordinating telescope and instruments. In order to connect to a service, application code specifies a service name—typically an instrument name—and a *style*, which defines the way in which the application will interact with the service. Two styles are currently supported: *keyword*, where the application reads and writes named keywords and the resulting inter-task message traffic is hidden; and *message*, where the application deals directly with messages. The keyword style is intended mainly for user interfaces, and the message style is intended mainly for lower-level applications.

KTL applications are event driven: a typical application first connects to all its desired services, then expresses interest in specified events. The application then enters an event dispatch loop in which it waits for events and calls the appropriate service's event-handling routine. Each event is associated with a callback routine which is invoked when the event occurs. Callback routines may (and typically do) interact with other sub-systems and KTL provides the means of doing so without blocking the application (vital for X Window user interfaces). This approach is a marriage of ideas culled from the X window, ADAM, Keck instrument and Keck telescope control systems.

A novel feature of KTL is that it knows nothing about any services or styles. Instead it defines a generic set of routines which must be implemented by all services and styles (essentially `open()`, `ioctl()`, `read()`, `write()`, `event()` and `close()`) and activates shareable libraries at run-time. Services have been implemented (in both keyword and message styles) for HIRES (the Keck high resolution echelle spectrograph built by Lick Observatory), LWS (the Keck long wavelength spectrometer built by UC San Diego) and the Keck telescope. Each of these implementations uses different underlying message systems: the Lick MUSIC system, RPCs, and direct sockets (respectively). Services for the remaining three front-line Keck instruments will be implemented over the next few months.