MX: A Portable Data Acquisition and Control Toolkit

William M. Lavender

Biological, Chemical, and Physical Sciences Department
Illinois Institute of Technology
Chicago, Illinois 60616

http://www.imca.aps.anl.gov/mx/

Why I Wrote MX

- Beamline control software packages have tended to be environment specific and non–portable.
- Many are centered around a particular interface method, e.g. CAMAC or VME.
- EPICS seemed to be a less than ideal choice, since it requires a rather high level of expertise to setup, maintain, and develop for.
- Users sometimes bring in their own equipment that they want to interface quickly to the beamline.

MX Control System Goals

- Encapsulate the core functionality in libraries like *libMx*.
- Make client–server functionality available.
- Require that *libMx* know very little about the application programs invoking it.
- Localize the knowledge *libMx* has of device hardware to driver functions with well defined interfaces.
- Minimize the effort required to implement new device drivers by putting as much functionality as is possible into generic code.

MX Control System Goals (cont.)

- Emphasize operating system independence.
- Require only ANSI C and BSD sockets or Winsock.
- Be able to interoperate with pre–existing beamline control systems.
- Try to minimize built–in assumptions about the structure of future data acquisition APIs.
- Do not depend on the presence of software that may not be freely distributed.
- Make the source code freely available.

MX Platforms

Linux 2.0 and 2.2	–	GCC
SGI Irix 6.3 and 6.5	–	SGI C compiler
Solaris 2.5 and 2.6	–	SPARCompiler C or GCC
HP/UX 10.20	–	HP/UX C compiler
SunOS 4.1.4	–	SPARCompiler C
Windows 95, 98, NT 4	–	Visual C++ 4, 5, or 6
MSDOS 6.2	–	DJGPP 2.0.2 and Watt32

MX Interface Types

RS–232	GPIB
CAMAC	Port I/O

MX Device Types

Motors	Scalers
Timers	Amplifiers
MCAs	Tables
Analog I/O	Digital I/O

MX Variable Types

Local MX EPICS

MX Scan Types

Quick scan	XAFS scan
Motor scan	Slit scan
Scaler scan	List scan

MX Motor Drivers

Compumotor 6000/6K	OMS VME−58 (EPICS or Linux)
McLennan PM−304	Delta Tau PMAC (via EPICS)
Newport MM−4000/4005	APS undulator (via EPICS)
Newport MM−3000	XIA HSC−1 slit controller
IMS Panther HI / HE	National Inst. ValueMotion
PI E−662 piezo controller	DSP Technology E500
Am9513−based controller	Joerger SMC−24
Velmex VP9000	Bruker D8 (prerelease)
MX network motor	DAC motor
SCIPE motor	Soft motor

MX Pseudomotor Drivers

- Monochromator
- X–ray wavelength
- XAFS wavenumber *(k)*
- Slit center or width
- Translation of motor group
- Position difference
- X–ray energy
- X–ray wavenumber
- Elapsed Time
- Table rotation or translation
- Linear combination of motors