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/
lavender@icarus.csrri.iit.edu

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 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

McLennan PM–304

Newport MM–4000/4005

Newport MM–3000

IMS Panther HI / HE

PI E–662 piezo controller

Am9513–based controller

Velmex VP9000

MX network motor

SCIPE motor

OMS VME–58 (EPICS or Linux)

Delta Tau PMAC (via EPICS)

APS undulator (via EPICS)

XIA HSC–1 slit controller

National Inst. ValueMotion

DSP Technology E500

Joerger SMC–24

Bruker D8 (prerelease)

DAC 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