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MEGA-AMPERE SPHERICAL TOKAMAK

IDAM

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MAST's Integrated Data Access Management system: IDAM

An Overview:

- designed to address specific MAST data management issues.
- enables access to numerous file formats, legacy and modern (IDA3, Ufile, netCDF-3, netCDF-4, HDF5, MDSPlus. Also PPF and JPF on JET.
- it adds data quality values at the signal level where none existed previously
- it automatically corrects for problems in data: in timings, calibrations, and labelling. Corrections are defined using XML.
- it builds new composite signals from signal components, defined using XML.
- these XML documents are recorded in a relational database.
- also recorded are:
    - how data are accessed, whether locally or remotely
    - how alias and generic signal names are mapped to true names
- IDAM has client server architecture, written in C.
- architecture independent: 32 or 64 bit, big or little endian.

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- C library has a single API and a set of accessor functions
- Single IDL function returns data as a structure.
- the API has two arguments:
    - signal alias or generic name or data object or server side function
    - shot number or data source entity

IDL example: rs = getdata('ip', 13500)

This returns a structure, rs, containing

NAME	NAME	STRING	'ip'	
SOURCE	SOURCE	STRING	'MAST::13500'	
STATUS	STATUS	LONG	1	
DATA	DATA	FLOAT	Array[7500]	**The data array with corrections**
DUNITS	DUNITS	STRING	'kA'	
DLABEL	DLABEL	STRING	'Plasma Current'	
ECLASS	ECLASS	LONG	0	
EDATA	EDATA	FLOAT	0.00000	**The associated array of error data**
TIME	TIME	DOUBLE	Array[7500]	**The coordinate data – time**
TUNITS	TUNITS	STRING	's'	
TLABEL	TLABEL	STRING	'Time (sec)'	
ERC	ERC	INT	0	**An Error return code**
ERRMSG	ERRMSG	STRING	''	**An error message**

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in this example, ip is the ITPA generic name for plasma current. The IDAM data server looks this up with the shot number 13500 in the IDAM relational database to identify the true signal name, data archive, file format, path and name. The IDAM data server then uses this to access a specific data reader for this format. Opens the file (handles are persistent), reads and returns the data to the client.

Other examples:

rs = getdata(‘ip’, ‘13500/1’) - repass 1 of shot 13500

rs = getdata(‘ppf::ip’, ‘jet::56000’) - jet ppf data. Method of access and signal identity is determined by the SQL database.

rs = getdata(‘ppf::ip’, ‘jet::56000’) - jet ppf data. Method of access and signal

rs = getdata('\top.inputs:cur','MDSPLUS::fuslwn/trmast/159052601')
access to a specific MDS+ data tree data node

rs = getdata('\top.inputs:cur','MDSPLUS::trmast/159052601')
access to the default MDS+ server

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rs = getdata('idamgetapi("ip",13500)','MDS+::fuslwn.culham.ukaea.org.uk')
execute a MDS+ TDI function on a specific MDS+ server

rs = getdata('PCURC','NETCDF::/scratch/idamtest/16392Z04.CDF')
read a private netCDF file

rs = getdata('/equilibrium/output/fluxFunctionProfiles/elongation','HDF5::./efitOutReference.hdf5')
read a private HDF5 file

rs = getData('/limiter', 'netcdf::./metaLimiters.nc')
access a data structure with limiter coordinates

rs = getData('/magCoil', 'netcdf::/home/…./metaMirnov.nc')
access a data structure with Mirnov coil positions, signal names, etc

rs = getData('/equilibriumStatus', 'netcdf::/home/…./netcdf/efitOut.nc')
access a data structure with an enumerated type

rs = getData('/output', 'netcdf::/home/…./netcdf/efitOut.nc')
access a netcdf sub-tree as a data structure

…… many more ……