Scan
User's Guide

Scan Class

Revision: release_1_12_6 - Author: flanglois
Implemented in C++ - CVS repository: tango-ds

Introduction:

A generic scan server for scanning any writeable attribute and reading any list of attributes. The scan server supports step and continuous scanning. It can do 1d, 2d or 3d scanning. Scannings are in general linear but can also be along a pre-calculated trajectory. The scan server coordinates all the actuators and sensors, reads out the data, writes it to a file if requested and fits the resulting data.

Class Description:

A generic scan server for scanning any writeable attribute and reading any list of attributes. The scan server supports step and continuous scanning. It can do 1d, 2d or 3d scanning. Scannings are in general linear but can also be along a pre-calculated trajectory. The scan server coordinates all the actuators and sensors, reads out the data, writes it to a file if requested and fits the resulting data.

Properties:

Device Properties		
Property name	**Property type**	**Description**
CurrentTimebase	Tango::DEV_STRING	used to store the timbase attribute value (as it doesn't change a lot
CurrentSaveMode	Tango::DEV_USHORT	Memories the mode of data saving (ON or OFF : 1 or 0
CurrentPath	Tango::DEV_STRING	Memory of the last Path
CurrentDataFilename	Tango::DEV_STRING	Memorization of the data filename
WaitClientAknowledge	Tango::DEV_SHORT	Wait for client to aknowledge at end of a scan in case of several scan within 1 run. aknowledge means to write 0 on the attribute currentScanEnded. 0 -> scan wil not wait (default) 1-> scan will wait

Device Properties Default Values:

Property Name	**Default Values**
CurrentTimebase	No default value
CurrentSaveMode	No default value
CurrentPath	No default value
CurrentDataFilename	No default value
WaitClientAknowledge	No default value

There is no Class properties.

States:

States	
Names	**Descriptions**
ON	Ready to scan
MOVING	Scanning
STANDBY	Pause State : the scan is in pause mode, and will be wake up by an action Resume
FAULT	Scan is Fault : Maybe stopped anormally

Attributes:

Scalar Attributes			
Attribute name	**Data Type**	**R/W Type**	**Expert**
timebase: A Tango device name managing the clock to measure the time to wait between each integration. To get precise timing, a timer board is usually in charge of this function	DEV_STRING	READ_WRITE	No
integration_time: The amount of time to integrate in seconds	DEV_DOUBLE	READ_WRITE	No
integration_time_sleep: Time to sleep between 2 interrogation of the IsCountingCompleted attribute of the Timebase used for count_number timed scans set by the EnableCountNumberMode(time)	DEV_DOUBLE	READ	Yes
data_file: Name of output file in which scan data will be saved See attribut file_format for format definition Default is mydatafile	DEV_STRING	READ_WRITE	No
file_format: string defining the required output file format : maybe ï¿½specï¿½ or ï¿½columnï¿½ for column based	DEV_STRING	READ_WRITE	No
n_steps: Read: Current number of steps of the 1st level of scan Write: the total number of steps of the 1st level of scan	DEV_LONG	READ_WRITE	No
dSteps: Delta Steps of a Scan (related with N Steps)	DEV_DOUBLE	READ_WRITE	No
n_steps2: Read: Current number of steps of the 2nd level of scan Write: the total number of steps of the 2nd level of scan	DEV_LONG	READ_WRITE	No
dSteps2: Delta Steps for second level of Scan (related with nSteps 2)	DEV_DOUBLE	READ_WRITE	No
scan_number: Write: Number of scans to execute. This parameter allows to loop and do more than 1 scan with the same actuators, sensors, start & end conditions Read: Current number of scan	DEV_LONG	READ_WRITE	No
path: Path for the scan data files (only the path, not the file name). Default is C temp	DEV_STRING	READ_WRITE	No
file_index: This is the starting index of the file	DEV_LONG	READ_WRITE	No
file_extension: This is the extension of the file Default is .dat	DEV_STRING	READ_WRITE	No
scan_time: time of the scan	DEV_DOUBLE	READ	Yes
step_time: Time of one step	DEV_DOUBLE	READ	Yes
step2_time: Time of one step2	DEV_DOUBLE	READ	Yes
nStepsTemp	DEV_LONG	READ	Yes
nSteps2Temp	DEV_LONG	READ	Yes
measureDate: Date of the current Data (in a long format : number of seconds since 01/01/1970) took at the start of the scan	DEV_LONG	READ	No
errorCounter: Error Counter for the GalilAxis error: cannot write on Moving Motor	DEV_LONG	READ	No

scanType: Type of the scan: 0 -> scan0d (timescan) 1 -> scan1d 2 -> scan2d	DEV_SHORT	READ	No
scanStarted: Flag Telling if scan has effectively started.	DEV_SHORT	READ	No
savingError: Flag saying if the saving is on error: 0 -> OK 1 -> ERROR	DEV_SHORT	READ	Yes
fastScanMode: Fast Scan Mode : ON / OFF	DEV_STRING	READ	Yes
actuatorsAfterScanAction: After Scan Action for the actuators (default 0): 0- Stay 1- Go to Start Position 2- Go to Prior Position 3- Go to Peak Position of the 1st sensor 4- Go to Valley Position of the 1st sensor 5- Go to +EDGE POS ï¿½ peak of derivative of 1st sensor 6- Go to -EDGE POS - valley of derivative of 1st sensor	DEV_SHORT	WRITE	Yes
currentScanEnded: Flag Saying to clients that the current scan from the current Run is Ended, so that the client can do its stuff and re-write this flag for the Run to continue.	DEV_SHORT	READ_WRITE	Yes
actuatorsDelay: Delay applied after all actuators movements	DEV_DOUBLE	WRITE	Yes

Spectrum Attributes			
Attribute name	**Data Type**	**X Data Length**	**Expert**
integrationTimeSpectrum: Spectrum of the integration time of the trajectory	DEV_DOUBLE	100000	Yes
start_positions: The starts positions for the actuators of the 1st level of scan	DEV_DOUBLE	50	No
end_positions: End positions for the actuators of the 1st level of scan	DEV_DOUBLE	50	No
start_positions2: The starts positions for the actuators of the 2nd level of scan	DEV_DOUBLE	50	No
end_positions2: End positions for the actuators of the 2nd level of scan	DEV_DOUBLE	50	No
actuators_data: Acutators data: number of steps of level1 * number of steps of level2 * number of actuators Max size is 10 000 000; eg for a scan 2 d: 1000 * 10000	DEV_DOUBLE	10000000	No
actuators2_data: Acutators 2 data: number of steps of level 2 * number of actuators2 max size is 1 000 000	DEV_DOUBLE	1000000	No
trajectory: Trajectory: X: Number of steps	DEV_DOUBLE	10000000	No
trajectory2: The trajectory of all actuators of level 2	DEV_DOUBLE	1000000	No
actuators: List of Actuators of the 1st level of scan	DEV_STRING	50	No
actuators2: List of Actuators of the 2nd level of scan	DEV_STRING	50	No
sensors: List of Sensors	DEV_STRING	50	No
scanHistory: History of the scan. what happened.	DEV_STRING	100000	No
timebases: List of timebases	DEV_STRING	100	No

Image Attributes				
Attribute name	**Data Type**	**X Data Length**	**Y Data Length**	**Expert**
sensors_data: The sensors data: X: number of total reads (steps) Y: number of sensors max size for X : 10 000 000 eg for a scan2d: 1000 * 10000	DEV_DOUBLE	10000000	50	No

Commands:

More Details on commands....

Device Commands for Operator Level		
Command name	**Argument In**	**Argument Out**
Init	DEV_VOID	DEV_VOID
State	DEV_VOID	DEV_STATE
Status	DEV_VOID	CONST_DEV_STRING
Scan0D	DEV_VOID	DEV_VOID
Scan1D	DEV_VOID	DEV_VOID
Scan2D	DEV_VOID	DEV_VOID
Abort	DEV_VOID	DEV_VOID
SetStartPositions	DEVVAR_DOUBLEARRAY	DEV_VOID
SetEndPositions	DEVVAR_DOUBLEARRAY	DEV_VOID
SetStartPositions2	DEVVAR_DOUBLEARRAY	DEV_VOID
SetEndPositions2	DEVVAR_DOUBLEARRAY	DEV_VOID
SetTrajectory2	DEVVAR_DOUBLEARRAY	DEV_VOID
SetIntegrationTimeSpectrum	DEVVAR_DOUBLEARRAY	DEV_VOID
Pause	DEV_VOID	DEV_VOID
Resume	DEV_VOID	DEV_VOID
Stop	DEV_VOID	DEV_VOID
ClearScanHistory	DEV_VOID	DEV_VOID
SetTimebases	DEVVAR_STRINGARRAY	DEV_VOID

Device Commands for Expert Level Only		
Command name	**Argument In**	**Argument Out**
SetActuators	DEVVAR_STRINGARRAY	DEV_VOID
SetActuators2	DEVVAR_STRINGARRAY	DEV_VOID
SetSensors	DEVVAR_STRINGARRAY	DEV_VOID
SetArmingSensors	DEVVAR_STRINGARRAY	DEV_VOID
SetTrajectory	DEVVAR_DOUBLEARRAY	DEV_VOID
EnableSave	DEV_VOID	DEV_VOID
DisableSave	DEV_VOID	DEV_VOID
EnableCountNumberMode	DEV_DOUBLE	DEV_VOID
DisableCountNumberMode	DEV_VOID	DEV_VOID
EnableFastScan	DEV_VOID	DEV_VOID
DisableFastScan	DEV_VOID	DEV_VOID

1 - Init

- **Description:** This commands re-initialise a device keeping the same network connection.
  After an Init command executed on a device, it is not necessary for client to re-connect to the device.
  This command first calls the device *delete_device()* method and then execute its *init_device()* method.
  For C++ device server, all the memory allocated in the *nit_device()* method must be freed in the *delete_device()* method.
  The language device desctructor automatically calls the *delete_device()* method.

- **Argin:**
  DEV_VOID : none.

- **Argout:**
  DEV_VOID : none.

- **Command allowed for:**
  - Tango::ON
  - Tango::MOVING
  - Tango::STANDBY
  - Tango::FAULT

2 - State

- **Description:** This command gets the device state (stored in its *device_state* data member) and returns it to the caller.

- **Argin:**
  DEV_VOID : none.

- **Argout:**
  DEV_STATE : State Code

- **Command allowed for:**
  - Tango::ON
  - Tango::MOVING
  - Tango::STANDBY
  - Tango::FAULT

3 - Status

- **Description:** This command gets the device status (stored in its *device_status* data member) and returns it to the caller.

- **Argin:**
  DEV_VOID : none.

- **Argout:**
  CONST_DEV_STRING : Status description

- **Command allowed for:**
  - Tango::ON
  - Tango::MOVING
  - Tango::STANDBY
  - Tango::FAULT

4 - SetActuators (for expert only)

- **Description:** Set the list of attributes which are actuators to scan. - x07ma/mo/thetam/AxisCurrentPosition (fully qualified device+attribute name) - xmbpm_slit1/Gap (if xmbpm_slit1 is defined in the Tango static DataBase as a device alias) - GapXbpmSlit1 (if defined in the Tango static DataBase as an attribute alias

- **Argin:**
  DEVVAR_STRINGARRAY : list of actuators e.g:motors

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::STANDBY
  - Tango::FAULT

5 - SetActuators2 (for expert only)

- **Description:** Set the list of attributes which are actuators of the level 2 of scan. - x07ma/mo/thetam/AxisCurrentPosition (fully qualified device+attribute name) - xmbpm_slit1/Gap (if xmbpm_slit1 is defined in the Tango static DataBase as a device alias) - GapXbpmSlit1 (if defined in the Tango static DataBase as an attribute alias

- **Argin:**
  DEVVAR_STRINGARRAY : list of actuators of the 2nd level of scan

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::STANDBY
  - Tango::FAULT

6 - SetSensors (for expert only)

- **Description:** Set list of attributes which are the sensors to read during the scan.

- **Argin:**
  DEVVAR_STRINGARRAY : set list of sensors to read e.g. detector

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::STANDBY
  - Tango::FAULT

7 - SetArmingSensors (for expert only)

- **Description:** Set the list of sensors that have to be armed, ie: the scanserver will execute the command Arm on them

- **Argin:**

DEVVAR_STRINGARRAY : list of sensors that have to be armed

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::STANDBY
  - Tango::FAULT

8 - Scan0D

- **Description:** scan continuously but don't move any actuators

- **Argin:**
  DEV_VOID :

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON

9 - Scan1D

- **Description:** Do a 1 dimensional Scan

- **Argin:**
  DEV_VOID :

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON

10 - Scan2D

- **Description:** Do a 2 dimensional scan of n by m steps and integrate at each step.

- **Argin:**
  DEV_VOID :

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON

11 - Abort

- **Description:** Abort current scan immediately

- **Argin:**
  DEV_VOID :

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::MOVING
  - Tango::STANDBY
  - Tango::FAULT

12 - SetStartPositions

- **Description:** Set the list of actuators start positions

- **Argin:**
  DEVVAR_DOUBLEARRAY : List of actuators start positions

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::MOVING
  - Tango::STANDBY
  - Tango::FAULT

13 - SetEndPositions

- **Description:** Set the list of actuators end positions

- **Argin:**
  DEVVAR_DOUBLEARRAY : List of actuators end positions

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::MOVING
  - Tango::STANDBY
  - Tango::FAULT

14 - SetStartPositions2

- **Description:** Set the list of actuators start positions of the 2nd level of scan

- **Argin:**
  DEVVAR_DOUBLEARRAY : List of actuators2 start positions

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::STANDBY
  - Tango::FAULT

15 - SetEndPositions2

- **Description:** Set the list of actuators end positions of the 2nd level of scan

- **Argin:**
  DEVVAR_DOUBLEARRAY : List of actuators2 end positions

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::STANDBY
  - Tango::FAULT

16 - SetTrajectory (for expert only)

- **Description:** Set a trajectory that the scan will follow instead of its traditionnal way

- **Argin:**
  DEVVAR_DOUBLEARRAY : Trajectory to be set

- **Argout:**

DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::STANDBY
  - Tango::FAULT

17 - SetTrajectory2

- **Description:** Set a trajectory that the scan will follow instead of its traditionnal way for the 2nd level ’s actuators

- **Argin:**
  DEVVAR_DOUBLEARRAY : the trajectory of all the actuators of level 2

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::STANDBY
  - Tango::FAULT

18 - EnableSave (for expert only)

- **Description:** Enable the saving of data

- **Argin:**
  DEV_VOID :

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::STANDBY
  - Tango::FAULT

19 - DisableSave (for expert only)

- **Description:** Disable the saving of data (eg for test scans

- **Argin:**
  DEV_VOID :

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::STANDBY
  - Tango::FAULT

20 - EnableCountNumberMode (for expert only)

- **Description:** Set the count number mode : the integration_time is in fact a number of count that the scan has to wait before next step. the argin is the sleeping time between the interrogation of the IsCountingCompletde of the timebase device.

- **Argin:**
  DEV_DOUBLE : time to sleep ,seconde)

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::STANDBY
  - Tango::FAULT

21 - DisableCountNumberMode (for expert only)

- **Description:** so use the classical integration_time

- **Argin:**
  DEV_VOID :

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::STANDBY
  - Tango::FAULT

22 - SetIntegrationTimeSpectrum

- **Description:** Set the IntegrationTimeSpectrum Attribute

- **Argin:**

DEVVAR_DOUBLEARRAY : Array of integration time values

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::STANDBY
  - Tango::FAULT

23 - Pause

- **Description:** Put the scan in a waiting mode. the resume of the scan will be set by execution of the command "Resume

- **Argin:**
  DEV_VOID :

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::MOVING
  - Tango::FAULT

24 - Resume

- **Description:** Resume the scan from its Pause mode

- **Argin:**
  DEV_VOID :

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::STANDBY

25 - Stop

- **Description:** Stop the Scan at the end of the current step

- **Argin:**
  DEV_VOID :

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::MOVING
  - Tango::STANDBY
  - Tango::FAULT

26 - ClearScanHistory

- **Description:** Clear the scanHistory attribute.

- **Argin:**
  DEV_VOID :

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::MOVING
  - Tango::STANDBY
  - Tango::FAULT

27 - EnableFastScan (for expert only)

- **Description:** Enable the Fast Scan Mode

- **Argin:**
  DEV_VOID :

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::FAULT

28 - DisableFastScan (for expert only)

- **Description:** Disable the Fast Scan Mode

- **Argin:**
  DEV_VOID :

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::FAULT

29 - SetTimebases

- **Description:** Set the timebases (devices

- **Argin:**
  DEVVAR_STRINGARRAY : list of timebases ,devices)

- **Argout:**
  DEV_VOID :

- **Command allowed for:**
  - Tango::ON
  - Tango::STANDBY
  - Tango::FAULT