
itoolkit Documentation

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1.1 Toolkit Object

class `itoolkit.iToolkit` (*iparm=0, iret=0, ids=1, irow=1*)
Main iToolkit XMLSERVICE collector and output parser.

Parameters

- **iparm** (*num*) – include xml node parm output (0-no, 1-yes).
- **iret** (*num*) – include xml node return output (0-no, 1-yes).
- **ids** (*num*) – include xml node ds output (0-no, 1-yes).
- **irow** (*num*) – include xml node row output (0-no, 1-yes).

Returns iToolkit (obj)

add (*obj*)

Add additional child object.

Parameters **none** –

Returns none

Notes

<?xml version='1.0'?> <xmlservice>

call (*itrans*)

Call xmlservice with accumulated input XML.

Parameters **itrans** (*obj*) – XMLSERVICE transport object

Returns none

clear ()

Clear collecting child objects.

Parameters none –

Returns (void)

Notes

<?xml version='1.0'?> <xmlservice>

dict_out (*ikey=0*)

return dict output.

Parameters **ikey** (*str*) – select ‘key’ from { ‘key’:’value’ }.

Returns ‘value’ }

Return type dict { ‘key’

hybrid_out (*ikey=0*)

return hybrid output.

Parameters **ikey** (*str*) – select ‘key’ from { ‘key’:’value’ }.

Returns { ‘data’:[list] }

Return type hybrid {key

list_out (*ikey=-1*)

return list output.

Parameters **ikey** (*num*) – select list from index [[0],[1],...].

Returns list [value]

trace_close ()

End trace (1.2+)

Parameters none –

Returns (void)

trace_hexdump (*itext*)

Write trace hexdump (1.2+) :param itext: trace text :type itext: str

Returns (void)

trace_open (*iname='*terminal'*)

Open trace *terminal or file /tmp/python_toolkit_(iname).log (1.2+)

Parameters **iname** (*str*) – trace *terminal or file /tmp/python_toolkit_(iname).log

Returns (void)

trace_write (*itext*)

Write trace text (1.2+)

Parameters **itext** (*str*) – trace text

Returns (void)

xml_in ()

return raw xml input.

Parameters none –

Returns xml

xml_out ()
return raw xml output.

Parameters none –

Returns xml

1.2 Toolkit Operations

class itoolkit.iPgm(*ikey*, *iname*, *iopt*={})
IBM i XMLSERVICE call *PGM.

Parameters

- **ikey** (*str*) – XML <ikey>...operation ...</ikey> for parsing output.
- **iname** (*str*) – IBM i *PGM or *SRVPGM name
- **iopt** (*dict*) – option - dictionary of options (below) {‘error’:‘onlofflfast’} : XMLSERVICE error choice {‘error’:‘fast’} {‘func’:‘MYFUNC’} : IBM i *SRVPGM function export. {‘lib’:‘mylib’} : IBM i library name {‘mode’:‘opmlile’} : XMLSERVICE error choice {‘mode’:‘ile’}

Example

```
iPgm('zzcall','ZZCALL') .addParm(iData('var1','1a','a')) .addParm(iData('var2','1a','b')) .ad-
dParm(iData('var3','7p4','32.1234')) .addParm(iData('var4','12p2','33.33')) .addParm(
    iDS('var5') .addData(iData('d5var1','1a','a')) .addData(iData('d5var2','1a','b')) .ad-
dData(iData('d5var3','7p4','32.1234')) .addData(iData('d5var4','12p2','33.33')) )
```

Returns iPgm (obj)

Notes

pgm:

```
<pgm name='
[lib=' func=' mode='opmlile' error='onlofflfast' (1.7.6) ]> ... </pgm>
```

add (*obj*)

Additional mini dom xml child nodes.

Parameters **obj** (*iBase*) – additional child object

Example

```
itool = iToolKit() itool.add(
    iPgm('zzcall','ZZCALL') <— child of iToolkit .addParm(iData('INCHARA','1a','a')) <— child
    of iPgm )
```

Returns (void)

addParm (*obj*, *iopt*={})

Add a parameter child node.

Parameters

- **obj** (*obj*) – iData object or iDs object.
- **iopt** (*dict*) – options to pass to iParm constructor

Returns (void)

make ()

Assemble coherent mini dom xml, including child nodes.

Parameters none –

Returns xml.dom.minidom (obj)

xml_in ()

Return XML string of collected mini dom xml child nodes.

Parameters none –

Returns XML (str)

class itoolkit.**iSrvPgm** (*ikey*, *iname*, *ifunc*, *iopt*={})

IBM i XMLSERVICE call *SRVPGM.

Parameters

- **ikey** (*str*) – XML <ikey>...operation ...</ikey> for parsing output.
- **iname** (*str*) – IBM i *PGM or *SRVPGM name
- **ifunc** (*str*) – IBM i *SRVPGM function export.
- **iopt** (*dict*) – option - dictionary of options (below) {‘error’:‘onlofffast’} : XMLSERVICE error choice {‘error’:‘fast’} {‘lib’:‘mylib’} : IBM i library name {‘mode’:‘opmlile’} : XMLSERVICE error choice {‘mode’:‘ile’}

Example

see iPgm

Returns iSrvPgm (obj)

Notes

pgm:

<pgm name=’

[lib=’ func=’ mode=’opmlile’ error=’onlofffast’ (1.7.6)]> ... </pgm>

add (*obj*)

Additional mini dom xml child nodes.

Parameters **obj** (*iBase*) – additional child object

Example

```
itool = iToolkit() itool.add(
    iPgm('zzcall','ZZCALL') <— child of iToolkit.addParm(iData('INCHARA','1a','a')) <— child
    of iPgm )
```

Returns (void)

addParm (*obj*, *iopt*={})

Add a parameter child node.

Parameters

- **obj** (*obj*) – iData object or iDs object.
- **iopt** (*dict*) – options to pass to iParm constructor

Returns (void)

addRet (*obj*)

Add a return structure child node.

Parameters **obj** (*obj*) – iData object or iDs object.

Returns (void)

make ()

Assemble coherent mini dom xml, including child nodes.

Parameters **none** –

Returns xml.dom.minidom (*obj*)

xml_in ()

Return XML string of collected mini dom xml child nodes.

Parameters **none** –

Returns XML (str)

class itoolkit.**iCmd** (*ikey*, *icmd*, *iopt*={})

IBM i XMLSERVICE call *CMD not returning *OUTPUT.

Parameters

- **ikey** (*str*) – XML <ikey>...operation...</ikey> for parsing output.
- **icmd** (*str*) – IBM i command no output (see 5250 command prompt).
- **iopt** (*dict*) – option - dictionary of options (below) {'error':'onlofflfast'} : XMLSERVICE error option {'exec':cmdsystemlrexx'} : XMLSERVICE command type {'exec':'cmd'}
RTVJOBA CCSID(?N) {'exec':'rex'}

Example

```
iCmd('chglibl', 'CHGLIBL LIBL(XMLSERVICE) CURLIB(XMLSERVICE)') iCmd('rtvjoba', 'RTVJOBA
CCSID(?N) OUTQ(?)')
```

Returns iCmd (*obj*)

Notes

Special commands returning output parameters are allowed. (?) - indicate string return (?N) - indicate numeric return

<cmd [exec='cmd|system|rexx' (default exec='cmd') hex='on' before='cc1/cc2/cc3/cc4' after='cc4/cc3/cc2/cc1' (1.6.8) error='onloff|fast' (1.7.6)]>IBM i command</cmd>

add (obj)

Additional mini dom xml child nodes.

Parameters **obj** (*iBase*) – additional child object

Example

```
itool = iToolkit() itool.add(
    iPgm('zzcall','ZZCALL') <— child of iToolkit .addParm(iData('INCHARA','1a','a')) <— child
    of iPgm )
```

Returns (void)

make ()

Assemble coherent mini dom xml, including child nodes.

Parameters **none** –

Returns xml.dom.minidom (obj)

xml_in ()

Return XML string of collected mini dom xml child nodes.

Parameters **none** –

Returns XML (str)

class itoolkit.iCmd5250 (ikey, icmd, iopt={})

IBM i XMLSERVICE call 5250 *CMD returning *OUTPUT.

Parameters

- **ikey** (*str*) – XML <ikey>... operation ... </ikey> for parsing output.
- **icmd** (*str*) – IBM i PASE script/utility (see call qp2term).
- **iopt** (*dict*) – option - dictionary of options (below) { 'error': 'onloff|fast' } : XMLSERVICE error choice { 'error': 'fast' } { 'row': 'onloff' } : XMLSERVICE wrap line in row tag? { 'row': 'off' }

Example

```
iCmd5250('dsplbl','dsplbl') iCmd5250('wrkactjob','wrkactjob')
```

Returns iCmd5250 (obj)

Notes

This is a subclass of iSh, therefore XMLSERVICE perfoms standard PASE shell popen fork/exec calls.

/QOpenSys/usr/bin/system 'wrkactjob'

Please note, this is a relatively slow operation, use sparingly on high volume web sites.

```
<sh [rows='onloff' hex='on' before='cc1/cc2/cc3/cc4' after='cc4/cc3/cc2/cc1' (1.7.4) error='onlofflfast'
(1.7.6) ]>(PASE utility)</sh>
```

add (*obj*)

Additional mini dom xml child nodes.

Parameters *obj* (*iBase*) – additional child object

Example

```
itool = iToolkit() itool.add(
```

```
    iPgm('zzcall','ZZCALL') <— child of iToolkit .addParm(iData('INCHARA','1a','a')) <— child
    of iPgm )
```

Returns (void)

make ()

Assemble coherent mini dom xml, including child nodes.

Parameters *none* –

Returns xml.dom.minidom (*obj*)

xml_in ()

Return XML string of collected mini dom xml child nodes.

Parameters *none* –

Returns XML (str)

class itoolkit.iSh (*ikey*, *icmd*, *iopt*={})

IBM i XMLSERVICE call PASE utilities.

Parameters

- **ikey** (*str*) – XML <ikey>...operation...</ikey> for parsing output.
- **icmd** (*str*) – IBM i PASE script/utility (see call qp2term).
- **iopt** (*dict*) – option - dictionary of options (below) { 'error': 'onlofflfast' } : XMLSERVICE error choice { 'error': 'fast' } { 'row': 'onloff' } : XMLSERVICE wrap line in row tag? { 'row': 'off' }

Example

```
iSh('ls /home/xml/master | grep -i xml')
```

Returns iSh (*obj*)

Notes

XMLSERVICE performs standard PASE shell popen calls, therefore, additional job will be forked, utilities will be exec'd, and stdout will be collected to be returned.

Please note, this is a relatively slow operation, use sparingly on high volume web sites.

```
<sh [rows='onloff' hex='on' before='cc1/cc2/cc3/cc4' after='cc4/cc3/cc2/cc1' (1.7.4) error='onlofffast'
(1.7.6) ]>(PASE utility)</sh>
```

add (*obj*)

Additional mini dom xml child nodes.

Parameters *obj* (*iBase*) – additional child object

Example

```
itool = iToolKit() itool.add(
    iPgm('zzcall','ZZCALL') <— child of iToolkit .addParm(iData('INCHARA','1a','a')) <— child
    of iPgm )
```

Returns (void)

make ()

Assemble coherent mini dom xml, including child nodes.

Parameters *none* –

Returns xml.dom.minidom (*obj*)

xml_in ()

Return XML string of collected mini dom xml child nodes.

Parameters *none* –

Returns XML (*str*)

class itoolkit.iXml (*ixml*)

IBM i XMLSERVICE raw xml input.

Parameters *ixml* (*str*) – custom XML for XMLSERVICE operation.

Example

```
iXml("<cmd>CHGLIBL LIBL(XMLSERVICE)</cmd>") iXml("<sh>ls /tmp</sh>")
```

Returns iXml (*obj*)

Notes

Not commonly used, but ok when other classes fall short.

add (*obj*)

add input not allowed.

Returns raise except

make ()

Assemble coherent mini dom xml.

Parameters *none* –

Returns xml.dom.minidom (obj)

xml_in()

Return XML string of collected mini dom xml child nodes.

Parameters *none* –

Returns XML (str)

class itoolkit.iDS(*ikey, iopt={}*)

Data structure child node for iPgm, iSrvPgm, or nested iDS data structures.

Parameters

- **ikey** (*str*) – XML <ds ... var="ikey"> for parsing output.
- **iopt** (*dict*) – option - dictionary of options (below) { 'dim': 'n' } : XMLSERVICE dimension/occurs number. { 'dou': 'label' } : XMLSERVICE do until label. { 'len': 'label' } : XMLSERVICE calc length label.

Example

see iPgm

Returns iDS (obj)

Notes

pgm data structure:

<ds [dim='n' dou='label' len='label' (1.5.4) data='records' (1.7.5)]>(see <data></ds>

add (*obj*)

Additional mini dom xml child nodes.

Parameters **obj** (*iBase*) – additional child object

Example

itool = iToolKit() itool.add(

iPgm('zzcall', 'ZZCALL') <— child of iToolkit.addParm(iData('INCHARA', '1a', 'a')) <— child of iPgm)

Returns (void)

addData (*obj*)

Add a iData or iDS child node.

Parameters **obj** (*obj*) – iData object or iDs object.

Returns (void)

make ()

Assemble coherent mini dom xml, including child nodes.

Parameters *none* –

Returns xml.dom.minidom (obj)

xml_in()

Return XML string of collected mini dom xml child nodes.

Parameters none –

Returns XML (str)

class itoolkit.iData (ikey, itype, ival, iopt={})

Data value child node for iPgm, iSrvPgm, or iDS data structures.

Parameters

- **ikey** (str) – XML <data ... var="ikey"> for parsing output.
- **iparm** (obj) – dom for parameter or return or ds.
- **itype** (obj) – data type [see XMLSERVICE types, '3i0', ...].
- **ival** (obj) – data type value.
- **iopt** (dict) – option - dictionary of options (below) { 'dim': 'n' } : XMLSERVICE dimension/occurs number. { 'varying': 'onloff12|4' } : XMLSERVICE varying { 'varying': 'off' }. { 'hex': 'onloff' } : XMLSERVICE hex character data { 'hex': 'off' }. { 'enddo': 'label' } : XMLSERVICE enddo until label. { 'setlen': 'label' } : XMLSERVICE set calc length label. { 'offset': 'n' } : XMLSERVICE offset label. { 'next': 'label' } : XMLSERVICE next offset label (value).

Example

see iPgm

Returns iData (obj)

Notes

pgm data elements:

<data type='data types'

[**dim='n'** varying='onloff12|4' enddo='label' setlen='label' (1.5.4) offset='label' hex='onloff' (1.6.8) before='cc1/cc2/cc3/cc4' (1.6.8) after='cc4/cc3/cc2/cc1' (1.6.8) trim='onloff' (1.7.1) next='nextoff' (1.9.2)]>(value)</data>

For more info on data types you can use, refer to <http://yips.idevcloud.com/wiki/index.php/XMLService/DataTypes>

add (obj)

Additional mini dom xml child nodes.

Parameters **obj** (iBase) – additional child object

Example

itool = iToolKit() itool.add(

iPgm('zzcall', 'ZZCALL') <— child of iToolkit .addParm(iData('INCHARA', '1a', 'a')) <— child of iPgm)

Returns (void)

make()

Assemble coherent mini dom xml, including child nodes.

Parameters none –

Returns xml.dom.minidom (obj)

xml_in()

Return XML string of collected mini dom xml child nodes.

Parameters none –

Returns XML (str)

1.3 Transports

class itoolkit.transport.**XmlServiceTransport** (*ctl='*here *cdata', ipc='*na'*)

XMLSERVICE transport base class

Parameters

- **ctl** (*str*) – XMLSERVICE control options, see <http://yips.idevcloud.com/wiki/index.php/XMLService/XMLSERVICEQuick#ctl>
- **ipc** (*str*) – An XMLSERVICE ipc key for stateful connections, see <http://yips.idevcloud.com/wiki/index.php/XMLService/XMLSERVICEConnect>

call (*tk*)

Call XMLSERVICE with accumulated actions

Parameters **tk** (*iToolkit*) – An iToolkit object

Returns The XML returned from XMLSERVICE

Return type str

1.3.1 HTTP Transport

class itoolkit.transport.**HttpTransport** (*url, user, password, database='*LOCAL', **kwargs*)

Call XMLSERVICE using FastCGI endpoint

For more information, refer to <http://yips.idevcloud.com/wiki/index.php/XMLService/XMLSERVICEGeneric>

Parameters

- **url** (*str*) – XMLSERVICE FastCGI endpoint eg. <https://example.com/cgi-bin/xmlcgi.pgm>
- **user** (*str*) – Database user profile name
- **password** (*str, optional*) – Database password
- **database** (*str, optional*) – Database name (RDB) to connect to
- ****kwargs** – Base transport options. See *XmlServiceTransport*.

call (*tk*)

Call XMLSERVICE with accumulated actions

Parameters `tk` (`iToolkit`) – An iToolkit object

Returns The XML returned from XMLSERVICE

Return type `str`

1.3.2 Database Transport

class `itoolkit.transport.DatabaseTransport` (`conn, **kwargs`)

Call XMLSERVICE using a database connection

Parameters

- **conn** – An active database connection object (PEP-249)
- **schema** (`str`, *optional*) – The XMLSERVICE stored procedure schema to use
- ****kwargs** – Base transport options. See *XmlServiceTransport*.

call (`tk`)

Call XMLSERVICE with accumulated actions

Parameters `tk` (`iToolkit`) – An iToolkit object

Returns The XML returned from XMLSERVICE

Return type `str`

1.3.3 SSH Transport

class `itoolkit.transport.SshTransport` (`sshclient=None`)

Transport XMLSERVICE calls over SSH connection.

Parameters **sshclient** (`paramiko.SSHClient`) – connected and authenticated connection

Example

```
from itoolkit.transport import SshTransport
import paramiko
ssh = paramiko.SSHClient() # configure paramiko.
Using only WarningPolicy() is not secure
ssh.set_missing_host_key_policy(paramiko.WarningPolicy())
ssh.connect(host, username="linux", password="linux1")
itransport = SshTransport(ssh)
```

Returns (`obj`)

call (`tk`)

Call xmlservice with accumulated input XML.

Parameters – **iToolkit object** (`tk`) –

Returns `xml`

1.3.4 Direct Memory Transport

class `itoolkit.transport.DirectTransport` (`**kwargs`)

Call XMLSERVICE directly in-process using _ILECALL

Parameters ****kwargs** – Base transport options. See *XmlServiceTransport*.

call (`tk`)

Call XMLSERVICE with accumulated actions

Parameters `tk` (`iToolkit`) – An iToolkit object

Returns The XML returned from XMLSERVICE

Return type `str`

Note: This transport will only work when run on an IBM i system. On other operating systems, calling it will fail with a `RuntimeError`.

Warning: This transport does not currently work on 64-bit versions of Python due to [this bug](#).

1.4 Deprecated Transports

class `itoolkit.rest.iRESTCall.iRestCall`

Deprecated since version 1.6.0: Use `itoolkit.transport.HttpTransport` instead.

class `itoolkit.db2.idb2call.iDB2Call`

Deprecated since version 1.6.0: Use `itoolkit.transport.DatabaseTransport` instead.

class `itoolkit.lib.ilibcall.iLibCall`

Deprecated since version 1.6.0: Use `itoolkit.transport.DirectTransport` instead.

2.1 Calling the DSPSYSSTS CL Command and Displaying Output

```
# Bottom
# Type command, press Enter.
# ==> dspsyssts
#
#                               Display System Status                               LP0364D
#                               06/22/15  15:22:28
# % CPU used . . . . . :      .1    Auxiliary storage:
# Elapsed time . . . . . : 00:00:01    System ASP . . . . . :    176.2 G
# Jobs in system . . . . . :      428    % system ASP used . . :    75.6481
import config
from itoolkit import *

itool = iToolKit()
itool.add(iCmd5250('dspsyssts', 'dspsyssts'))

# xmlservice
itool.call(config.itransport)

# output
dspsyssts = itool.dict_out('dspsyssts')
if 'error' in dspsyssts:
    print (dspsyssts['error'])
    exit()
else:
    print (dspsyssts['dspsyssts'])
```

2.2 Calling the RTVJOBA CL Command and Getting Output Parameters

```
# RTVJOBA can't issue from command line,  
# but works with itoolkit  
import config  
from itoolkit import *  
  
# modify iToolKit not include row node  
itool = iToolKit(iparm=0, iret=0, ids=1, irow=0)  
itool.add(iCmd('rtvjoba', 'RTVJOBA USRLIBL(?) SYSLIBL(?) CCSID(?) OUTQ(?)'))  
  
# xmlservice  
itool.call(config.itransport)  
  
# output  
rtvjoba = itool.dict_out('rtvjoba')  
print (rtvjoba)  
if 'error' in rtvjoba:  
    print (rtvjoba['error'])  
    exit()  
else:  
    print ('USRLIBL = ' + rtvjoba['USRLIBL'])  
    print ('SYSLIBL = ' + rtvjoba['SYSLIBL'])  
    print ('CCSID   = ' + rtvjoba['CCSID'])  
    print ('OUTQ    = ' + rtvjoba['OUTQ'])
```

2.3 Calling the PASE ps Command and Getting Output

```
# > ps -ef  
#      UID    PID  PPID    C   STIME     TTY   TIME CMD  
#  qsecofr    12    11     0  May 08      -   8:33 /QOpenSys/QIBM/ProdData/JavaVM/jdk60/  
→32bit/jre/lib/ppc/jvmStartPase 566  
# qtmhhttp    31     1     0  May 08      -   0:00 /usr/local/zendsvr/bin/watchdog -c /  
→usr/local/zendsvr/etc/watchdog-monitor.ini -s monitor  
import config  
from itoolkit import *  
  
itool = iToolKit()  
itool.add(iSh('ps', 'ps -ef'))  
  
# xmlservice  
itool.call(config.itransport)  
  
# output  
ps = itool.dict_out('ps')  
if 'error' in ps:  
    print (ps['error'])  
    exit()  
else:  
    print (ps['ps'])
```

2.4 Tracing to the Terminal

```
import config
from itoolkit import *
itool = iToolkit()
itool.add(
    iPgm('zzcall', 'ZZCALLNOT')
    .addParm(iData('INCHARA', '1a', 'a'))
)

# xmlservice write trace log to *terminal
itool.trace_open()
itool.call(config.itransport)
itool.trace_close()

zzcall = itool.dict_out('zzcall')
if 'success' in zzcall:
    print (zzcall['success'])
else:
    print (zzcall['error'])
    exit()
```

2.5 Tracing to a File

```
import config
from itoolkit import *
itool = iToolkit()
itool.add(
    iPgm('zzcall', 'ZZCALLNOT')
    .addParm(iData('INCHARA', '1a', 'a'))
)

# xmlservice write trace log to /tmp/python_toolkit_(tonyfile).log
itool.trace_open('tonyfile')
itool.call(config.itransport)
itool.trace_close()

zzcall = itool.dict_out('zzcall')
if 'success' in zzcall:
    print (zzcall['success'])
else:
    print (zzcall['error'])
    exit()
```

2.6 Calling an RPG Program

```
import config
from itoolkit import *
# XMLSERVICE/ZZCALL:
```

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```
#      D  INCHARA      S      1a
#      D  INCHARB      S      1a
#      D  INDEC1       S      7p 4
#      D  INDEC2       S      12p 2
#      D  INDS1        DS
#      D  DSCHARA      1a
#      D  DSCHARB      1a
#      D  DSDEC1       7p 4
#      D  DSDEC2       12p 2
#      *+++++*
#      * main(): Control flow
#      *+++++*
#      C      *Entry      PLIST
#      C      PARM      INCHARA
#      C      PARM      INCHARB
#      C      PARM      INDEC1
#      C      PARM      INDEC2
#      C      PARM      INDS1
itool = iToolKit()
itool.add(iCmd('chglbl', 'CHGLIBL LIBL(XMLSERVICE)'))
itool.add(
    iPgm('zzcall', 'ZZCALL')
    .addParm(iData('INCHARA', '1a', 'a'))
    .addParm(iData('INCHARB', '1a', 'b'))
    .addParm(iData('INDEC1', '7p4', '32.1234'))
    .addParm(iData('INDEC2', '12p2', '33.33'))
    .addParm(
        iDS('INDS1')
        .addData(iData('DSCHARA', '1a', 'a'))
        .addData(iData('DSCHARB', '1a', 'b'))
        .addData(iData('DSDEC1', '7p4', '32.1234'))
        .addData(iData('DSDEC2', '12p2', '33.33'))
    )
)

# xmlservice
itool.call(config.itransport)

# output
chglbl = itool.dict_out('chglbl')
if 'success' in chglbl:
    print (chglbl['success'])
else:
    print (chglbl['error'])
    exit()

zzcall = itool.dict_out('zzcall')
if 'success' in zzcall:
    print (zzcall['success'])
    print ("      INCHARA      : " + zzcall['INCHARA'])
    print ("      INCHARB      : " + zzcall['INCHARB'])
    print ("      INDEC1       : " + zzcall['INDEC1'])
    print ("      INDEC2       : " + zzcall['INDEC2'])
    print ("      INDS1.DSCHARA: " + zzcall['INDS1']['DSCHARA'])
    print ("      INDS1.DSCHARB: " + zzcall['INDS1']['DSCHARB'])
    print ("      INDS1.DSDEC1 : " + zzcall['INDS1']['DSDEC1'])
    print ("      INDS1.DSDEC2 : " + zzcall['INDS1']['DSDEC2'])
```

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```

else:
    print (zzcall['error'])
    exit()

```

2.7 Calling a Service Program with “Hole” Parameter

```

import config
from itoolkit import *
# Retrieve Hardware Resource List (QGYRHRL, QgyRtvHdwRscList) API
# Service Program: QGYRHR
# Default Public Authority: *USE
# Threadsafe: No
# Required Parameter Group:
# Output Char(*).....Receiver variable (RHRL0100, RHRL0110)
# Input Binary(4).....Length of receiver variable
# Input Char(8).....Format name
# Input Binary(4).....Resource category (see hardware resource category)
# I/O Char(*).....Error code
# RHRL0100 Format
# BINARY(4).....Bytes returned
# BINARY(4).....Bytes available
# BINARY(4).....Number of resources returned
# BINARY(4).....Length of resource entry
# CHAR(*).....Resource entries
# These fields repeat for each resource.
# BINARY(4).....Resource category
# BINARY(4).....Family level
# BINARY(4).....Line type
# CHAR(10).....Resource name
# CHAR(4).....Type number
# CHAR(3).....Model number
# CHAR(1).....Status
# CHAR(8).....System to which adapter is connected
# CHAR(12).....Adapter address
# CHAR(50).....Description
# CHAR(24).....Resource kind (liar, liar, pants on fire ... binary,
↳not char)
# hardware resource category:
# 1 All hardware resources (does not include local area network resources)
# 2 Communication resources
# 3 Local work station resources
# 4 Processor resources
# 5 Storage device resources
# 6 Coupled system adapter resources
# 7 Local area network resources
# 8 Cryptographic resources
# 9 Tape and optical resources
# 10 Tape resources
# 11 Optical resources
itool = iToolKit()
itool.add(
    iSrvPgm('qgyrhr', 'QGYRHR', 'QgyRtvHdwRscList')
    .addParm(

```

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```

iDS('RHRL0100_t',{'len':'rhrlen'})
.addData(iData('rhrRet','10i0',''))
.addData(iData('rhrAvl','10i0',''))
.addData(iData('rhrNbr','10i0','',{'enddo':'mycnt'}))
.addData(iData('rhrLen','10i0',''))
.addData(iDS('res_t',{'dim':'999','dou':'mycnt'})
    .addData(iData('resCat','10i0',''))
    .addData(iData('resLvl','10i0',''))
    .addData(iData('resLin','10i0',''))
    .addData(iData('resNam','10a',''))
    .addData(iData('resTyp','4a',''))
    .addData(iData('resMod','3a',''))
    .addData(iData('resSts','1a',''))
    .addData(iData('resSys','8a',''))
    .addData(iData('resAdp','12a',''))
    .addData(iData('resDsc','50h','')) # was 50a
    .addData(iData('resKnd','24h','')) # was 24b
)
)
.addParm(iData('rcvlen','10i0','',{'setlen':'rhrlen'}))
.addParm(iData('fmtnam','10a','RHRL0100'))
.addParm(iData('rescat','10i0','3')) # 3 Local work station resources
.addParm(
    iDS('ERRC0100_t',{'len':'errrlen'})
    .addData(iData('errRet','10i0',''))
    .addData(iData('errAvl','10i0',''))
    .addData(iData('errExp','7A','',{'setlen':'errrlen'}))
    .addData(iData('errRsv','1A',''))
)
)
# xmlservice
itool.call(config.itransport)
#output
qgyrhr = itool.dict_out('qgyrhr')
if 'success' in qgyrhr:
    print (qgyrhr['success'])
    print ("    Length of receiver variable....." + qgyrhr['rcvlen'])
    print ("    Format name....." + qgyrhr['fmtnam'])
    print ("    Resource category....." + qgyrhr['rescat'])
    RHRL0100_t = qgyrhr['RHRL0100_t']
    print ('    RHRL0100_t:')
    print ("    Bytes returned....." + RHRL0100_t['rhrRet'])
    print ("    Bytes available....." + RHRL0100_t['rhrAvl'])
    print ("    Number of resources returned..." + RHRL0100_t['rhrNbr'])
    print ("    Length of resource entry....." + RHRL0100_t['rhrLen'])
    if int(RHRL0100_t['rhrNbr']) > 0:
        res_t = RHRL0100_t['res_t']
        for rec in res_t:
            print ("    -----")
            keys = rec.keys()
            print ("    Resource category....." + rec['resCat'])
            print ("    Family level....." + rec['resLvl'])
            print ("    Line type....." + rec['resLin'])
            print ("    Resource name....." + rec['resNam'])
            print ("    Type number....." + rec['resTyp'])
            print ("    Model number....." + rec['resMod'])
            print ("    Status....." + rec['resSts'])

```

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```

    print ("      System adapter connected....." + rec['resSys'])
    print ("      Adapter address....." + rec['resAdp'])
    print ("      Description....." + rec['resDsc'])
    print ("      Resource kind....." + rec['resKnd'])
else:
    print (qgyrhr['error'])
    exit()

```

2.8 Calling a Service Program

```

import config
from itoolkit import *
# Retrieve Hardware Resource List (QGYRHRL, QgyRtvHdwRscList) API
# Service Program: QGYRHR
# Default Public Authority: *USE
# Threadsafe: No
# Required Parameter Group:
#  Output Char(*).....Receiver variable (RHRL0100, RHRL0110)
#  Input Binary(4).....Length of receiver variable
#  Input Char(8).....Format name
#  Input Binary(4).....Resource category (see hardware resource category)
#  I/O Char(*).....Error code
# RHRL0100 Format
#  BINARY(4).....Bytes returned
#  BINARY(4).....Bytes available
#  BINARY(4).....Number of resources returned
#  BINARY(4).....Length of resource entry
#  CHAR(*).....Resource entries
#  These fields repeat for each resource.
#  BINARY(4).....Resource category
#  BINARY(4).....Family level
#  BINARY(4).....Line type
#  CHAR(10).....Resource name
#  CHAR(4).....Type number
#  CHAR(3).....Model number
#  CHAR(1).....Status
#  CHAR(8).....System to which adapter is connected
#  CHAR(12).....Adapter address
#  CHAR(50).....Description
#  CHAR(24).....Resource kind (liar, liar, pants on fire ... binary,
↳not char)
#  hardware resource category:
#  1  All hardware resources (does not include local area network resources)
#  2  Communication resources
#  3  Local work station resources
#  4  Processor resources
#  5  Storage device resources
#  6  Coupled system adapter resources
#  7  Local area network resources
#  8  Cryptographic resources
#  9  Tape and optical resources
#  10 Tape resources
#  11 Optical resources
itool = iToolKit()

```

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```

itool.add(
    iSrvPgm('qgyrhr', 'QGYRHR', 'QgyRtvHdwRscList')
    .addParm(
        iDS('RHRL0100_t', {'len': 'rhrLen'})
        .addData(iData('rhrRet', '10i0', ''))
        .addData(iData('rhrAvl', '10i0', ''))
        .addData(iData('rhrNbr', '10i0', '', {'enddo': 'mycnt'}))
        .addData(iData('rhrLen', '10i0', ''))
        .addData(iDS('res_t', {'dim': '999', 'dou': 'mycnt'}))
            .addData(iData('resCat', '10i0', ''))
            .addData(iData('resLvl', '10i0', ''))
            .addData(iData('resLin', '10i0', ''))
            .addData(iData('resNam', '10a', ''))
            .addData(iData('resTyp', '4a', ''))
            .addData(iData('resMod', '3a', ''))
            .addData(iData('resSts', '1a', ''))
            .addData(iData('resSys', '8a', ''))
            .addData(iData('resAdp', '12a', ''))
            .addData(iData('resDsc', '50a', ''))
            .addData(iData('resKnd', '24b', ''))
        )
    )
    .addParm(iData('rcvlen', '10i0', '', {'setlen': 'rhrLen'}))
    .addParm(iData('fmtnam', '10a', 'RHRL0100'))
    .addParm(iData('rescat', '10i0', '3')) # 3 Local work station resources
    .addParm(
        iDS('ERRC0100_t', {'len': 'errLen'})
        .addData(iData('errRet', '10i0', ''))
        .addData(iData('errAvl', '10i0', ''))
        .addData(iData('errExp', '7A', '', {'setlen': 'errLen'}))
        .addData(iData('errRsv', '1A', ''))
    )
)
# xmlservice
itool.call(config.itransport)
#output
qgyrhr = itool.dict_out('qgyrhr')
if 'success' in qgyrhr:
    print (qgyrhr['success'])
    print ("    Length of receiver variable....." + qgyrhr['rcvlen'])
    print ("    Format name....." + qgyrhr['fmtnam'])
    print ("    Resource category....." + qgyrhr['rescat'])
    RHRL0100_t = qgyrhr['RHRL0100_t']
    print ("    RHRL0100_t:")
    print ("        Bytes returned....." + RHRL0100_t['rhrRet'])
    print ("        Bytes available....." + RHRL0100_t['rhrAvl'])
    print ("        Number of resources returned..." + RHRL0100_t['rhrNbr'])
    print ("        Length of resource entry....." + RHRL0100_t['rhrLen'])
    if int(RHRL0100_t['rhrNbr']) > 0:
        res_t = RHRL0100_t['res_t']
        for rec in res_t:
            print ("    -----")
            keys = rec.keys()
            print ("        Resource category....." + rec['resCat'])
            print ("        Family level....." + rec['resLvl'])
            print ("        Line type....." + rec['resLin'])
            print ("        Resource name....." + rec['resNam'])

```

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```

print ("      Type number....." + rec['resTyp'])
print ("      Model number....." + rec['resMod'])
print ("      Status....." + rec['resSts'])
print ("      System adapter connected...." + rec['resSys'])
print ("      Adapter address....." + rec['resAdp'])
print ("      Description....." + rec['resDsc'])
print ("      Resource kind....." + rec['resKind'])
else:
    print (qgyrhr['error'])
    exit()

```

2.9 Calling a Service Program With an Array Parameter

```

import config
from itoolkit import *
#      D ARRAYMAX          c          const(999)
#      D dcRec_t           ds          qualified based(Template)
#      D  dcMyName          10A
#      D  dcMyJob           4096A
#      D  dcMyRank          10i 0
#      D  dcMyPay           12p 2
#      *****
#      * zzarray: check return array aggregate
#      *****
#      P zzarray           B          export
#      D zzarray           PI         likeds(dcRec_t) dim(ARRAYMAX)
#      D  myName            10A
#      D  myMax             10i 0
#      D  myCount           10i 0
itool = iToolKit()
itool.add(iCmd('chglbl', 'CHGLIBL LIBL(XMLSERVICE)'))
itool.add(
    iSrvPgm('zzarray','ZZSRV','ZZARRAY')
    .addParm(iData('myName','10a','ranger'))
    .addParm(iData('myMax','10i0','8'))
    .addParm(iData('myCount','10i0','',{'enddo':'mycnt'}))
    .addRet(
        iDS('dcRec_t',{'dim':'999','dou':'mycnt'})
        .addData(iData('dcMyName','10a',''))
        .addData(iData('dcMyJob','4096a',''))
        .addData(iData('dcMyRank','10i0',''))
        .addData(iData('dcMyPay','12p2',''))
    )
)

# xmlservice
itool.call(config.itransport)

# output
# print(itool.xml_out())
chglbl = itool.dict_out('chglbl')
if 'success' in chglbl:

```

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```

    print (chglibl['success'])
else:
    print (chglibl['error'])
    exit()

zzarray = itool.dict_out('zzarray')
# print(zzarray)
if 'success' in zzarray:
    print (zzarray['success'])
    print ("      myName      : " + zzarray['myName'])
    print ("      myMax       : " + zzarray['myMax'])
    print ("      myCount      : " + zzarray['myCount'])
    dcRec_t = zzarray['dcRec_t']
    for rec in dcRec_t:
        print ('      dcRec_t:')
        print ("      dcMyName : " + rec['dcMyName'])
        print ("      dcMyJob  : " + rec['dcMyJob'])
        print ("      dcMyRank : " + rec['dcMyRank'])
        print ("      dcMyPay  : " + rec['dcMyPay'])
else:
    print (zzarray['error'])
    exit()

```

2.10 Using *debug to Cause XMLSERVICE to Enter a Message Wait

```

from itoolkit import *
from itoolkit.transport import DirectTransport

print("*****")
print("*****")
print("Hey user,")
print("Using '*debug' transport parameter allows debug halt before run.")
print ("\n  itransport = DirectTransport('*here *debug')\n")
print("Expect qsysopr inquire message, you must answer to continue script.")
print("You may attach a debugger before you answer the inquiry.")
print ("\n  dspmsg qsysopr\n")
print("  Reply inquiry message any character.")
print("    From . . . :   ADC           06/25/15   14:08:07")
print("    Debug client 362262/QSECOFR/QP0ZSPWP")
print("    Reply . . . :   c\n")
print("Script continues to run after answer (call PGM, etc.)")
print("*****")
print("*****")

itransport = DirectTransport("*here *debug") # i will stop, inquiry message qsysopr
itool = iToolkit()
itool.add(iCmd('chglibl', 'CHGLIBL LIBL(XMLSERVICE)'))
itool.add(
    iPgm('zzcall', 'ZZCALL')
    .addParm(iData('INCHARA', '1a', 'a'))
    .addParm(iData('INCHARB', '1a', 'b'))
    .addParm(iData('INDEC1', '7p4', '32.1234'))
    .addParm(iData('INDEC2', '12p2', '33.33'))

```

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```
.addParm(
    iDS('INDS1')
    .addData(iData('DSCHARA','1a','a'))
    .addData(iData('DSCHARB','1a','b'))
    .addData(iData('DSDEC1','7p4','32.1234'))
    .addData(iData('DSDEC2','12p2','33.33'))
)
)

# xmlservice
itool.call(itransport)

# output
chglibl = itool.dict_out('chglibl')
if 'success' in chglibl:
    print (chglibl['success'])
else:
    print (chglibl['error'])
    exit()

zzcall = itool.dict_out('zzcall')
if 'success' in zzcall:
    print (zzcall['success'])
    print ("    INCHARA      : " + zzcall['INCHARA'])
    print ("    INCHARB      : " + zzcall['INCHARB'])
    print ("    INDEC1       : " + zzcall['INDEC1'])
    print ("    INDEC2       : " + zzcall['INDEC2'])
    print ("    INDS1.DSCHARA: " + zzcall['INDS1']['DSCHARA'])
    print ("    INDS1.DSCHARB: " + zzcall['INDS1']['DSCHARB'])
    print ("    INDS1.DSDEC1 : " + zzcall['INDS1']['DSDEC1'])
    print ("    INDS1.DSDEC2 : " + zzcall['INDS1']['DSDEC2'])
else:
    print (zzcall['error'])
    exit()
```

2.11 Using iXml to Get XMLSERVICE Diagnostics

```
import config
from itoolkit import *

# from itoolkit.transport import DirectTransport
# itransport = DirectTransport("*here *debug") # i will stop, inquiry message qsysopr

itool = iToolKit()
itool.add(iCmd('chglibl2', 'CHGLIBL LIBL(QTEMP XMLSERVICE)'))
itool.add(iCmd('chglibl3', 'CHGLIBL LIBL(SOMEBAD42)'))
myxml = "<diag/>"
itool.add(iXml(myxml))

print(itool.xml_in())

# xmlservice
```

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```

itool.call(config.itransport)
# itool.call(itransport)

# output
print(itool.xml_out())
diag = itool.dict_out()
if 'version' in diag:
    print ("version      : "+diag['version'])
print ("job           : "+diag['jobnbr']+'/'+diag['jobuser']+'/'+diag['jobname'])
print ("jobipc        : "+diag['jobipc'])
print ("curuser       : "+diag['curuser'])
print ("ccsid         : "+diag['ccsid'])
print ("dftccsid      : "+diag['dftccsid'])
print ("paseccsid     : "+diag['paseccsid'])
print ("syslibl       : "+diag['syslibl'])
print ("usrlibl       : "+diag['usrlibl'])
joblog = diag['joblog'].replace("\n", " ")
cpflist = ""
for word in joblog.split(' '):
    if word[:3] == 'CPF' or word[:3] == 'MCH':
        cpflist += word + " "
        if diag['jobcpf'] == "":
            diag['jobcpf'] = word
print ("jobcpf        : "+diag['jobcpf'] + " ( " + cpflist + ")")
print ("joblog         : \n" + diag['joblog'])

```

2.12 Using iXml to Call a Program with a Varchar Parameter

```

import config
from itoolkit import *
# XMLSERVICE/ZZSRV.ZZVARY:
#      P zzvary          B                export
#      D zzvary          PI              20A  varying
#      D  myName         10A  varying
itool = iToolKit()
itool.add(iXml("<cmd var='chglibl'>CHGLIBL LIBL(XMLSERVICE)</cmd>"))
myxml = "<pgm name='ZZSRV' func='ZZVARY' var='zzvary'>"
myxml += "<parm io='in'>"
myxml += "<data var='myName' type='10A' varying='on'><![CDATA[<Ranger>]]></data>"
myxml += "</parm>"
myxml += "<return>"
myxml += "<data var='myNameis' type='20A' varying='on'><![CDATA[<Mud>]]></data>"
myxml += "</return>"
myxml += "</pgm>"
itool.add(iXml(myxml))

# xmlservice
itool.call(config.itransport)

# output
chglibl = itool.dict_out('chglibl')
if 'success' in chglibl:
    print (chglibl['success'])
else:

```

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```
print (chglbl['error'])
exit()

zzvary = itool.dict_out('zzvary')
if 'success' in zzvary:
    print (zzvary['success'])
    # print ("      myName          : " + zzvary['myName']) ... input only, no output
    print ("      myNameis       : " + zzvary['myNameis'])
else:
    print (zzvary['error'])
    exit()
```


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