N·S·D·C
National
Skill Development
Corporation

Transforming the skill landscape

Integration Architecture

Of

SDMS

20 May 2017

Version 1.0

(Rakesh Ranjan, Consultant-IT)

Table of Content

1 About SDMS

Skill Development Management System (SDMS) is a software application platform which supports core mandate of *National Skills Development Corporation* (NSDC) to invest in scalable, high quality, for-profit vocational training initiatives. SDMS is used by MSDE, NSDC, Training Partners of NSDC (TP) & their Training Centers (TC), Sector Skill Councils (SSCs), Assessment Agencies (AA) and Assessors for different roles that they perform in the training ecosystem.

Over years, SDMS has emerged as one of the key enablers of the skill ecosystem which is leveraged by multiple ministries for master data management, downstream business processes and reporting. MSDE, Govt. of India, through its revised PMKVY 2016-2020 scheme desires to skill 10 million youth by 2020 with a total investment of Rs 12,000 Crores. Such large-scale transformation initiative requires the support environment to adapt and scale up accordingly therefore it is natural that SDMS, being one of the key enablers, should also undergo transformation to effectively fulfil the objectives of the scheme.

One such transformation which has become extremely necessary is provision for data exchange between external software applications operating in the skill ecosystem. It is envisaged that SDMS will adopt API based data exchange infrastructure which will allow both data read and write between disjoint systems belonging to skill ecosystem. Following are the advantages of deploying an API framework:

- ✓ Strict control over data exchange procedures with ecosystem partners through enforcement of terms of usage and data security
- ✓ Unified API framework available for use by multiple internal applications; e.g. old SDMS and new SDMS
- ✓ Complete isolation of SDMS, its database and other internal applications from the outside world to further enhance data security

2 Objective & Structure of this Document

This is a technical document, available publicly, meant for software application developers & architects who would be interested in knowing the technical specification of each interface using which the services published to external applications are leveraged. Readers of this document must always ensure that only the latest version is referred because new services will be continuously added to the document and changes to the interface design are also expected to make service more secure and efficient. Moreover, it is expected that all users of SDMS join the Google group "***nsdcwebapi***" to submit queries for the community to respond. Whenever a

dedicated email or phone support is provisioned by NSDC to answer technical queries on SDMS integration then the community will be notified appropriately.

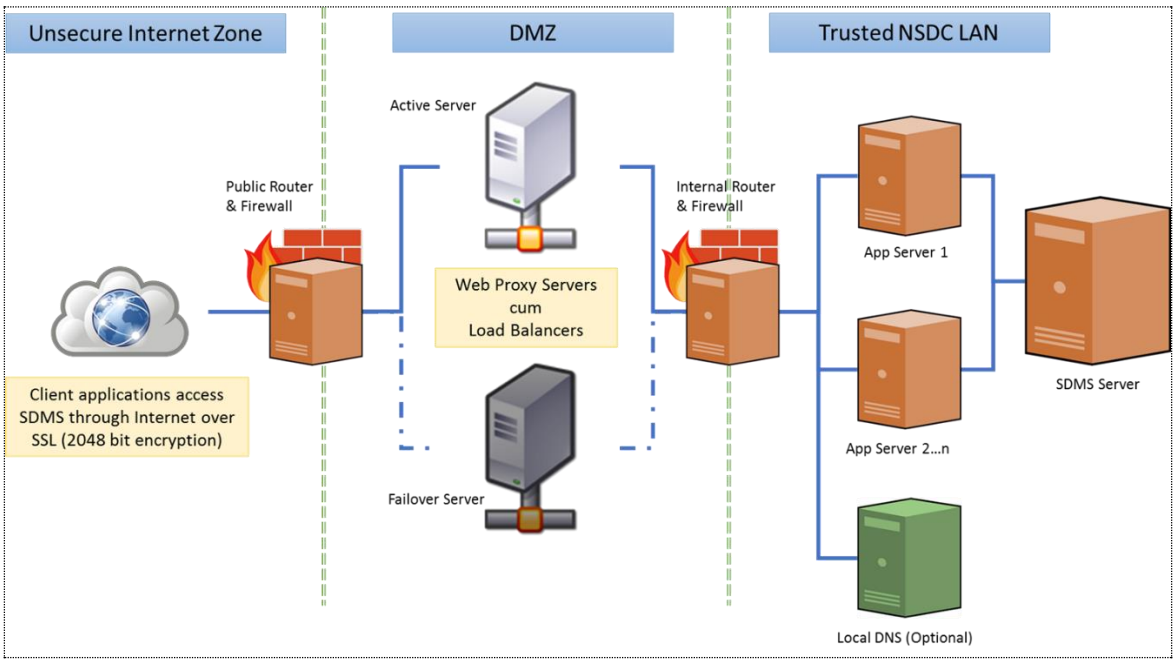
3 Transactional Services

Transactional services refer all services belonging to SDMS which either query or modify data on SDMS. Following principles shall apply to all Transactional services:

a. Available on internet through SSL enabled URLs
b. Support Http POST and GET methods only
c. Allow requests from whitelisted server IP addresses only – server that are authorized to consume the service in question
d. POST requests to accept payload in pre-defined XML format only (refer subsequent sections for request XML structure). All such request XMLs shall be digitally signed by Class II or III digital certificates issued only by Licensed Certifying Authorities[1].
e. GET requests to accept requests only from whitelisted server IP addresses – server that are authorized to consume web services

3.1 High Level Architecture

Given below is a high-level representation of the network diagram. Objective is to allow access to client applications over internet for quick onboarding while ensuring highest level of security.



[1] http://www.cca.gov.in/cca/?q=licensed_ca.html

3.2 HTTP POST Method

All http requests requiring writing of data on SDMS server shall be accepted through POST method only. All the POST requests shall have the payload in pre-approved XML format only. User applications are expected to migrate to latest version of the XML and services whenever an update takes however NSDC shall allow time-bound limited backward compatibility to application who may not upgrade immediately upon notification of a new release by NSDC.

3.2.1 Service URL

All the POST services will be available through the URL

https://webapi.nsdcindia.org:8443/sdmsweb/*<servicename>*/*<txncode>*/*<api-key>*/*<licensekey>*

Always supply header **"Content-Type"** as **"application/xml"**

URL parts are explained below:

URL Parts	Description
servicename	Refer table in the subsequent section for the name of the service
txncode	Your transaction code which will be returned without change in the response for correlation between the request and response
API Key	Unique identifier of the service
License key	40-character long API key provided by NSDC at the time of onboarding or at the time of renewal. Requests accompanied with expired api-keys shall be rejected with appropriate error message

3.2.2 XML Format

The XML format should strictly adhere to the template given below otherwise the request will be rejected with appropriate error message.

```
<?xml version="1.0" standalone="yes" encoding="UTF-8"?>
<Env>
        <Sender sid="" lk="" />
        <Meta ver="" lang="" ts="" txn="" tkn=""/>
        <Data key="" format="">Base-64 encoded (optionally encrypted) data values</Data>
        <Signature>Signature of Sender</Signature>
</Env>
```

Details of XML elements are explained in the table below:

Element	Description
Env	Enclosing tag
sid	Unique sender Id (numeric, length 10) issued by NSDC to user organizations
lk	License key issued to the user organization with validity period
ver	Version of the API requested by the user organization. All API shall support limited backward compatibility to support the applications that do not upgrade immediately to latest versions of the APIs
lang	Language code. Default code will be "EN" for English
ts	Timestamp captured at the sender's server. It is expected that servers are synced frequently with a NTP server in India. It is expected that value of "ts" is within 30 seconds of time on NSDC server. Requests having "ts" outside of 30 seconds' limit will be rejected with appropriate messages
txn	Transaction code of the user organization for correlation between request and response. Value of "txn" will be returned without any modification
tkn	(Optional) Any authentication token e.g. One Time Password required by the API
key	(Optional) Encrypted key to decrypt data, if applicable
format	Format of decoded and decrypted information – permissible values are "text"," xml"and "json"
Data	Data in any format whether plain text, xml or json etc. but Base64 encoded. It must be remembered that if the data contains any PII (Personally Identifiable Information) then the same must be encrypted with NSDC's public key before Base64 encoding.
Signature	- XML payload must be digitally signed by the sender to ensure message integrity and non-repudiation - Digital signing is always done by the sender organization with a certificate within validity period - Only class II or III certificates must be used - Signature should include key info element that contains X.509 certificate details. This is needed for SDMS server to validate the signer -

3.3 HTTP GET Methods

All queries from user organizations requiring information from SDMS shall be provided through GET method. Requests received through GET method shall only read data on SDMS server or an external system but shall not make any change to the data.

3.3.1 GET Request Format

All URLs shall have parameters supplied as path parameters only. Necessary information specific to each query service shall be published by NSDC. Format of the URL shall be of the type:

https://webapi.nsdcindia.org:8443/sdmsweb/fservices/<senderid>/<service name>/<version>/<language code>/<API key>/<License Key>/<Transaction Code>/<base64 encoded query params>

URL parts are explained below:

URL Parts	Description
Sender Id	Unique 32-char long alphanumeric sender Id assigned to the requestor entity by NSDC.
Service Name	Unique name of the query service invoked
Version	Supported version of the API
Language Code	Default will be English "EN" or as advised in the services table below
API Key	Unique identifier for each service
License Key	Valid 40-character long Alphanumeric API key provided by NSDC to the requestor entity. Expired API keys will not work
Transaction Code	Transaction code of the requestor entity. NSDC will return the code without any processing for correlation between request and the response
Params	All the query params must be provided in Base64 encoded format. As an example, query params "***name=suresh&age=30&gender=m***" shall be provided as Base64 equivalent as "***bmFtZT1zdXJlc2gmYWdlPTMwJmdlbmRlcj1t***". Refer following sections for parameter details about each service Note: **Do not** start query parameters string with "?"

3.4 Common Response Template

All the responses from the SDMS shall be encrypted and digitally signed to ensure that only designated user organizations access the data, which may have PII too. Even if response does not contain PII, NSDC as a rule shall return responses in encrypted format only. The response template is explained below (Download XSD Template. Also download common-types.xsd):

```
<?xml version="1.0" standalone="yes" encoding="UTF-8"?>
<Response xmlns="http://www.nsdcindia.org/response/1.0">
        <Result status="" err="" ref="" ts="" info="" txn=""/>
        <Data key="" format="">Base-64 encoded data values</Data>
        <Signature />
</Response>
```

Details of response XML elements are explained in the table below:

Element	Description
Response	Enclosing tag
status	Valid values are "SUCCESS" and "FAIL"
err	Error code if status="FAIL" otherwise "NA" is returned. (Refer error codes)
ref	Transaction reference number on SDMS server. User organizations must provide the reference number in case of a transaction related enquiry
ts	Timestamp of the transaction on SDMS server in ISO8601 format
info	Additional information about the transaction that SDMS may want to return (Optional)
txn	Transaction Code of the user organization. It is returned without change to correlate between request and response
key	Encrypted key value used to encrypt the enclosed data.
format	SDMS will return encrypted data only in PLAIN text, XML or JSON format. Permissible values are "TEXT", "XML" and "JSON".
Enclosed data	Base64 encoded data value (*in the current version, data will not be encrypted*)
Signature	Digitally Signed XML along with the Signature information of NSDC

3.5 Error Codes

Following error codes are the valid error codes that will be returned through response XML if an error takes place. Otherwise "err" attribute will be returned blank.

Error Code	Description
E001	Invalid sender Id
E002	Invalid License Key
E003	Expired License Key
E004	Invalid API key or an expired key

Error Code	Description
E005	Invalid version code
E006	Unsupported version of the API
E007	Unsupported language code
E008	Invalid timestamp format
E009	Blank user transaction code
E010	Key not decrypted
E011	Invalid Base64 encoding
E012	Unsupported format – permissible formats are text, XML & JSON only
E013	Data format does not comply with the format type indicated
E014	Digital signature verification failed
E015	Invalid key info on the signature
E016	No payload received
E017	Invalid XML Payload
E018	Invalid service name
E019	Invalid User Transaction Identifier
E020	Request received from unauthorized IP address
E021	Third party service error
E022	Digital Signature of Sender not found on the server
E023	Digital Signature not within validity date
E024	Data encryption error
E025	Internal Error
E026	Mandatory parameters not supplied
E027-050	Reserved for future enhancements
E999	Unknown Error
NA	No Error/Success

4 List of SDMS Web Services

Below is the list of web services which will be published on SDMS server as RESTful web services. User organizations are expected to refer latest version of this document to obtain the latest list of services published. All the web services will be published on an NSDC server available through a public IP available through a SSL enabled URL.

SL. No.	Name of the Web Service	Params	Description
Query Services (GET)			

SL. No.	Name of the Web Service	Params	Description
1	fetchtp	Base64 encoded value of "*Token=bnNkYzd0ZXBp&insertDate=yyyy-mm-dd*"	Fetch all Training Partner information from QCI's Smart portal
2	fetchtc	Base64 encoded value of "*Token=bnNkYzd0ZXBp&insertDate=yyyy-mm-dd*"	Fetch all Training Center information from QCI's Smart portal
Update Services (POST)			
4	addtp	NA	Add one or more Training Partner/ Project Implementation Agency Download XSD <URL of the XSD>
5	addtc	NA	Add one or more Training Center Download XSD <URL of the XSD>
6	pushuritodigilocker	NA	

5 Onboarding Process & Pre-requisites

a. Send a request to NSDC on your organization's letter head indicating the intent and purpose of using NSDC's services. Letters must be addressed to "*Capt. Uday Prasad, Head-IT, National Skill Development Corporation, Block-A, Clarion Collection (Qutab Hotel), Shaheed Jeet Singh Marg, New Delhi - 110016*"

b. Sign the MoU with NSDC to mutually agree on the terms of usage services & data

c. Complete the onboarding process with NSDC and obtain the following:
   - 10-character long numeric Sender Id. One unique sender Id will be issued to every requestor to be used on perpetual basis after signing of the MoU
   - 40-character long alphanumeric API Key. The keys issued will require renewal after the expiry date is exceeded. Normally, NSDC will issue API keys that will be valid for a period of 12 months or until the expiry of the MoU whichever is earlier.
   - Share your public key in PEM format with ***.cer** extension with NSDC which will be used to encrypt the sensitive data elements in the response XML. Your Digital

Certificate must have been procured by one of the Licensed Certifying Authorities in India (http://cca.gov.in/cca/)

- Designate a management and a technical point of contact for future communication

d. Join the Google group "**nsdcwebapi**" to post technical queries and answer queries of other developers/ architects in the ecosystem
e. Specific queries which are not technical in nature may be sent to webapihelp@nsdcindia.org

*** End of the Document ***