QUALIFICATION FILE – CONTACT DETAILS OF SUBMITTING BODY

Name and address of submitting body:

NIELIT Chandigarh,

Plot No. C-134, Phase VIII, Industrial Area, Sector 72, Mohali. 160071.

Name and contact details of individual dealing with the submission

Name: Dr. Manish Arora

Position in the organisation Joint Director (Systems)

Address if different from above NA

Tel number(s)   0172-2236470

E-mail address   manisharora@nielit.gov.in

List of documents submitted in support of the Qualifications File

1. Detailed Curriculum (Attached at Annexure I)
2. Evidence of Job (Attached at Annexure II)
3. Placement Records (Attached at Annexure III)
4. Annexure IV - Industry Validations
5. Since the proposed jobrole has not been identified by SSC, the industry mapping will be as per progression pathways as indicated in the QF

6. QUALIFICATION FILE SUMMARY

Qualification Title	Certified Cloud Computing and Virtualization Expert
Qualification Code	**NIELIT/IT/L6/029**
Nature and Purpose of Qualification	To provide technical skill to manage Cloud based Data Centres
Body/bodies which will assess candidates	National Institute of Electronics and Information Technology
Body/bodies which will award the certificate for the qualification.	National Institute of Electronics and Information Technology
Body which will accredit providers to offer the qualification.	National Institute of Electronics and Information Technology
Occupation(s) to which the qualification gives access	Cloud Computing and Virtualization Expert
Licensing Requirements	N/A
Proposed level of the qualification in the NSQF.	6
Anticipated Volume of training/learning required to complete the qualification	210 hours.
Entry requirements / recommendations.	3year diploma/Undergraduate with knowledge of any computer language, Internet Concepts and Network Concepts.

Progression from the qualification.	1) In Academic
	   Integrate Cloud Computing and Advance Diploma in Big Data analytics(NIELIT Course) in Data Centres. Many companies are providing Big Data as a Service solution to individuals and organization for analysing large data using Big Data tools over Cloud Computing and virtualization infrastructure.
	2) Professional
	   Initially, candidates can work as Virtualization Engineer/Programmer/Cloud and Virtualization Expert whose role would be to identify virtualization requirement and provide virtualized solution in Cloud to clients at service provider end. Later on, they can be **Data Centre Architect** whose

	job would be to setup Data Centre that provides various services like IaaS, SaaS and PaaS. Data Centre Architect is a very highly skilled architect with cross-industry and cross-functional know-how
Planned arrangements for RPL.	• Presently only candidates who undergo training shall be assessed.
International Comparability where know	• The institutes like VMWare and Cirtrix provide similar certification programme on individual component
Date of planned review of the qualification	• After 2 years from date of launch.(june 2019)

Formal structure of the qualification

Title of unit or other component (include any identification code used)	Mandatory/ Optional	Estimated size (learning hours)	Level
Demonstrate & Practice of Cloud Technology and Services	Mandatory	45	
Preparation of Infrastructure Services	Mandatory	60	
Preparation of Software Services	Mandatory	60	6
Characterize Managing and Securing Cloud	Mandatory	30	
Enhancing Communication Skill	Mandatory	15	

Please attach any document giving further detail about the structure of the qualification – eg a Curriculum or Qualification Pack. Nil

SECTION 1
ASSESSMENT

Name of assessment body:

National Institute of Electronics and Information Technology
6-CGO Complex, Electronics Niketan,
Lodhi Road, New Delhi. 110003.

Will the assessment body be responsible for RPL assessment?

Give details of how RPL assessment for the qualification will be carried out and quality assured.

Presently only candidates undergoing training shall be assessed. Later on candidates having

experience and knowledge shall be assessed. The information will be provided on finalization of such procedure.

Describe the overall assessment strategy and specific arrangements which have been put in place to ensure that assessment is always valid, consistent and fair and show that these are in line with the requirements of the NSQF:

The emphasis is on practical demonstration of skills & knowledge based on the performance criteria. Each OUTCOME is assessed & marked separately. Student is required to pass in all OUTCOMEs individually and marks are allotted. Following assessment methodologies are used.

A. Written Assessment (Multiple Choice Questions)
B. Practical Assessment
C. Viva Voce Assessment

The assessment results are backed by following evidences.
1 The assessor collects a copy of the attendance for the training done under the scheme. The attendance sheets are signed and stamped by the In charge / Head of the Training Centre.
2 The assessor verifies the authenticity of the candidate by checking the photo ID card issued by the institute as well as any one Photo ID card issued by the Central/Government. The same is mentioned in the attendance sheet.
3 The assessor assigns roll number.
4 The assessor takes photograph of all the students along with the assessor standing in the middle and with the centre name/banner at the back as evidence.

Please attach any documents giving further information about assessment and/or RPL.
ASSESSMENT EVIDENCE

Complete the following grid for each grouping of NOS, assessment unit or other component as listed in the entry on the structure of the qualification on page 1.

Job Role   Cloud and Virtualization Expert

Title of Unit/Component:

Assessable Outcomes	Assessment criteria for the outcome	Total Mark	Written	Practical	Vivo-voce
1. Demonstrate & Practice of Cloud Technology and Services	Procedure of Deployment	125	15	15	5
	Operate and Delivery of Cloud Services		15	15	10
	Identify & use Available Cloud Services		20	20	10
	Total		**50**	**50**	**25**
2. Preparation of Infrastructure Services	Prepare Virtualized Environment	125	25	25	10
	Provide Infrastructure Services		25	25	15
	Total		**50**	**50**	**25**

3. Preparation of Software Services	Deploy application as a service	125	25	25	10
	Configure application as a service		25	25	15
		Total	**50**	**50**	**25**
4. Characterize Managing and Securing Cloud	Establish procedure for Managing Cloud Data Centres	125	25	25	10
	Execute procedure on Securing Cloud Data Centres		25	25	15
		Total	**50**	**50**	**25**
5 Enhancing Communication Skill	Interaction with superior, colleagues and clients				10
	Managing career, staff and professional relationships				20
	Mock interview				20
		Total			**50**
	Grand Total	**550**	**200**	**200**	**50**

Means of assessment 1

Proctored online assessments (LAN and Web based), carried out using a variety of question formats applicable for linear / adaptive methodologies; performance criteria being assessed via situation judgement tests, simulations, code writing, psychometrics and multiple choice questions etc.

SECTION 2

EVIDENCE OF NEED

What evidence is there that the qualification is needed?

Cloud computing is a computing paradigm, where large number of servers are connected in private of public network to provide dynamic scalable infrastructure for application, data and file storage. The cost of computation application hosting, content storage, delivery is reduced significantly. The services are delivered over Internet. It is based on the concept of pay as you use. The client pays for usages like any other utility bills. Different cloud computing models are Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS) The services are provided through either private cloud or public cloud or community cloud or hybrid cloud. Analyst group Forrester expects the global cloud computing market will grow from $35bn (£22.5bn) in 2011 to around $150bn by 2020 as it

becomes key to many organizations' IT infrastructure. Alongside this increase in demand from enterprise, there will be development in the technologies that support clouds, with rapid increase in processing power making cloud projects even cheaper, while technologies currently limited to supercomputing will make it into the mainstream. And of course, by 2020, a generational shift will occur in organizations that means a new generation of CIOs will be in charge who have grown up using cloud-based tools, making them far more willing to adopt cloud on an enterprise scale

(Source: http://www.zdnet.com/cloud-computing-10-ways-it-will-change-by-2020-7000001808/).

IDC expects that as many as 7 million new cloud-related jobs will be available worldwide by that time. The author of the IDC report (Cushing Anderson) says that "Unlike IT skill shortages in the past, solving this skills gap is extremely challenging, given that cloud brings a new set of skills, which haven't been needed in the past."

(Source: http://blogs.iit.edu/itm_loopback/2013/04/11/cloud-computing-7-million-job-opportunities/)

According to the Forbes article, lack of training, certification or experiences are the top three reasons cloud positions go un-filled. Anderson says several skill sets are key to building and maintaining cloud capabilities within organizations.

Virtualization has become an integral part of Cloud Computing. It simplifies the delivery of services by providing a platform for optimizing complex IT resources in a scalable manner, which is what makes cloud computing so cost effective. Virtualization can be applied very broadly to just about everything you can imagine including memory, networks, storage, hardware, operating systems, and applications. Virtualization has three characteristics that make it ideal for cloud computing: Partitioning, Isolation and Encapsulation. Virtualization is basically using hardware as software.

According to Oracle CEO Mark Hurd " The cloud is the only way to make that leapfrog from where you are to where you have to be ". Presently, only 25 percent of production applications are in Cloud. One of 11 critical Cloud predictions of 2016 is that 80% production applications are heading towards Cloud.

(Source: https://www.oracle.com/cloud/cloud-predictions.html)

Virtualization reduces capital expenses, and standards and automation reduce operational expenses. Virtualization is done at Hardware level, software level, desktop level, database level etc. According to Gartner Inc, nearly half of the large enterprises will have hybrid cloud deployment by the end of 2017. "Indian IT infrastructure is poised to be a US$2.35 billion market by 2017," Research Director at Gartner says. "After sluggish market conditions in 2013, the Indian infrastructure market will witness investments primarily fuelled by key IT initiatives that include mobility, cloud and Big Data."

As per CISCO Global Cloud Index: Forecast and Methodology, 2014-2019 White Paper, By 2019, more than four-fifths (86 percent) of workloads will be processed by cloud data centers; 14 percent will be processed by traditional data centers. Overall data center

workloads will more than double (2.5-fold) from 2014 to 2019; however, cloud workloads will more than triple (3.3-fold) over the same period. The workload density (that is, workloads per physical server) for cloud data centers was 5.1 in 2014 and will grow to 8.4 by 2019. Comparatively, for traditional data centers, workload density was 2.0 in 2014 and will grow to 3.2 by 2019. By 2019, 56 percent of the cloud workloads will be in public cloud data centers, up from 30 percent in 2014. (CAGR of 44 percent from 2014 to 2019). By 2019, 44 percent of the cloud workloads will be in private cloud data centers, down from 70 percent in 2014. (CAGR of 16 percent from 2014 to 2019).

(Source: http://www.cisco.com/c/en/us/solutions/collateral/service-provider/global-cloud-index-gci/Cloud_Index_White_Paper.html)

What is the estimated uptake of this qualification and what is the basis of this estimate?

I. By 2020, a generational shift will occur in organizations that means a new generation of CIOs will be in charge who have grown up using cloud-based tools, making them far more willing to adopt cloud on an enterprise scale.

II. T pros have good reason to be optimistic about finding riches in the cloud. In the U.S. today, 3.9 million jobs are associated with cloud computing, with 384,478 of them in IT, according to Forbes. The median salary for IT professionals with cloud computing experience is $90,950. Currently, there are 18,239,258 cloud computing jobs worldwide, 40.8% of which are located in China. There is an explosion in both cloud computing use and demand for people who can help with cloud migrations. There are about 100 jobs chasing eachqualified candidate at this point in time, according to technical recruiters. That disparity will likely grow later this year, and in 2016.

(Source: http://searchcloudcomputing.techtarget.com/feature/Are-you-on-the-right-cloud-computing-career-path)

III. 1.7 million cloud-related jobs that went unfilled in 2012 (Source : http://www.forbes.com/sites/joemckendrick/2012/12/21/almost-1-7-million-cloud-related-jobs-went-unfilled-in-2012-estimate/#652beb71fa2b)

What steps were taken to ensure that the qualification(s) does/do not duplicate already existing or planned qualifications in the NSQF?
As the understanding and adoption models of QPs evolve in the industry and across its sub-sectors, we foresee consolidation of qualification packs as a natural progression. The Qualification does not exist as per information available in public domain.

What arrangements are in place to monitor and review the qualification(s)? What data will be used and at what point will the qualification(s) be revised or updated?
The Qualification is to be monitored and reviewed every two years.
The following data will be used
1. Results of assessments
2. Employer feedback will be sought post-placement
3. Student feedbacks

SECTION 3
SUMMARY EVIDENCE OF LEVEL

Level of qualification: 8

Summary of Direct Evidence:

Justify the NSQF level allocated to the QP by building upon the five descriptors of NSQF. Explain the reasons for allocating the level to the QP.

Generic NOS is/are linked to the overall authority attached to the job role.

Cloud and Virtualization Expert					
Process required	**Professional knowledge**	**Professional skill**	**Core skill**	**Responsibility**	**Level**
Cloud and Virtualization Expert carries out jobs to manage networks and prepare data centres for virtualization. Cloud and Virtualization Expert acquires wide range of practical and conceptual skills to virtualize server and provide services over Cloud to clients	Cloud and Virtualization Expert will be competent to identify technical requirements in terms of hardware, software and other IT related devices for providing virtualized services over Cloud.	Individual is able to manage and secure cloud. They are proficient in managing servers in Cloud environment based on detailed design and practical knowledge gained during course	Cloud and Virtualization Experts are able to deliver services to Cloud users as per client requirements They are able to make independent decision involved in providing services and identify hardware and software requirements.	They are able to lead team as well as work in team.	**6**
6	6	6	6	6	

SECTION 4

EVIDENCE OF RECOGNITION OR PROGRESSION

What steps have been taken in the design of this or other qualifications to ensure that there is a clear path to other qualifications in this sector?

This qualification has comprises both technical and analytic skills and can be linked to any qualification higher than this one, existing or to come.

Amazon Web Services (AWS) provides a broad set of products and services anyone can use as building blocks to run sophisticated and scalable applications. Running applications in the AWS Cloud can help move faster, operate more securely, and save substantial costs; all while benefitting from the scale and performance of the cloud. (https://aws.amazon.com/solutions/). . NIELIT has recently signed MoU with Amazon for imparting training on AWS (Amazon, Web Services)

Microsoft's Azure provides PaaS services

Please attach any documents giving further information about any of the topics above.
Give details of the document(s) here:
Sources:
> https://aws.amazon.com/solutions/
> https://azure.microsoft.com/en-in/

SECTION 5

EVIDENCE OF INTERNATIONAL COMPARABILITY

List any comparisons which have been established.

VMWare provide wide range of certification and on demand courses on their products for virtualization. Main focus is on installing and configuring machines in Data Centre and prepare platform for providing services.

Source: https://mylearn.vmware.com/mgrReg/plan.cfm?plan=39210&ui=www_edu

Citrix provide certificate courses, few are listed below.
  i. Citrix Certified Expert-Virtualization
  ii. Citrix Certified Professional – Virtualization
  iii. Citrix Certified Associate – Virtualization
  iv. Citrix Certified Associate – Networking

Source: http://training.citrix.com/cms/education/certification/