Government of Pakistan

**National Vocational and Technical Training Commission**

**Prime Minister Youth Skills Development Program**

"Skills for All"

**Course Contents / Lesson Plan**
**Course Title: HCCDP - SOLUTIONS ARCHITECTURE**
**Duration:** 3 Months

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| **Author Name** | **CyberVision/Huawei** |
| **Course Title** | **HCCDP – SOLUTIONS ARCHITECT** |
| **Objectives and Expectations** | The HCCDP – Solution Architect course equips participants with the knowledge and skills to design, deploy, and manage secure, scalable, and efficient cloud solutions using Huawei Cloud. It prepares learners to assess business needs, architect end-to-end cloud infrastructures, and implement best practices in cloud security, networking, storage, and automation. By the end of the program, participants are expected to demonstrate proficiency in Huawei Cloud services, develop and test enterprise-grade cloud architectures, and be prepared to pass the HCCDP certification exam. |
| **Entry-level of trainees** | Currently enrolled in at least the 7th semester of a bachelor's degree program (i.e., completed 6 semesters with a transcript)<br>OR<br>Pursuing a graduate/postgraduate degree in a relevant field such as:<br>• Information Technology (IT)<br>• Computer Science<br>• Mechatronics<br>• Electrical or Electronics Engineering<br>• Computer Systems Engineering<br><br>Candidates who have completed a Diploma in Information Technology (DIT) and have relevant field experience such as internships, freelance work, or professional roles in IT, networking, or technical support are eligible for this program. |
| **Minimum Qualification of Teachers** | • **Minimum Qualification:** Master's degree (16 years of education) in Computer Science, Information Technology, Software Engineering, Systems Engineering, or a closely related discipline from a recognized institution.<br>• **Certification Requirement:** Must be Huawei Certified — preferably HCCDP – Solutions Architecture or higher. Equivalent certifications in cloud infrastructure, system design, or enterprise architecture may also be considered.<br>• **Professional Experience:** Minimum of 2 years of hands-on industry experience in solution design, enterprise systems architecture, cloud platforms, infrastructure planning, or related ICT domains.<br>• Proven ability to design and deliver technical training, conduct assessments, and mentor learners effectively.<br>• Experience with project-based and hands-on lab learning, supporting trainees in applying core technical concepts in real-world scenarios. |

**Scheme of Studies**

**Huawei HCCDP - SOLUTIONS ARCHITECTURE**
**(3-Month Course)**

| Sr. No | Main Topics | Theory Hrs. | Practical Hrs. | Total Hrs. | Credit Hours |
|---|---|---|---|---|---|
| 1. | Introduction to Huawei Cloud & Architecture Design Methodology | 15 | 0 | 15 | 1.5 |
| 2. | Cloud Infrastructure & Service System Design | 06 | 9 | 15 | 1.05 |
| 3. | Cloud Compute Solution Design | 05 | 10 | 15 | 1 |
| 4. | Cloud Storage Solution Design | 04 | 11 | 15 | 0.95 |
| 5. | Cloud Network Architecture and Design | 03 | 12 | 15 | 0.9 |
| 6. | Cloud Database Solution Design | 03 | 12 | 15 | 0.9 |
| 7. | Cloud Security and Compliance Architecture | 04 | 11 | 15 | 0.95 |
| 8. | Cloud Operations & Maintenance (O&M) Design | 6 | 9 | 15 | 1.05 |
| 9. | Distributed and Scalable System Architecture | 6 | 9 | 15 | 1.05 |
| 10. | Disaster Recovery (DR) and High Availability Design | 6 | 9 | 15 | 1.05 |
| 11. | Containers, Microservices, and Automation in Cloud Architecture | 5 | 10 | 15 | 1 |
| 12. | Capstone Project & Certification Preparation | 5 | 10 | 15 | 1 |
| **Total** | | 68 | 112 | 180 | 13 |

**Course Execution Plan**

The total duration of the **course: 3 months**
**Theory: 37%**
**Practical: 63%**

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| | **Total Hours of Study: 180 Hours** |
| **Companies offering jobs in the respective trade** | • **PTCL (Pakistan Telecommunication Company Limited)**<br>• **Jazz (Mobilink)**<br>• **Telenor Pakistan**<br>• **Zong (China Mobile Pakistan)**<br>• **National Data Consultants (NDC Tech)**<br>• **Systems Limited**<br>• **Inbox Business Technologies**<br>• **World Call Telecom Limited**<br>• **Vision Telecom Pvt Ltd**<br>• **COMSATS Internet Services**<br>• **NSC Global**<br>• **Siemens**<br>• **Saif Telecom**<br>• **Descon Engineering**<br>• **Descon Mirani**<br>• **Presson Descon**<br>• **Olayan Descon**<br>• **JGC- Descon / DIP**<br>• **Etimaad**<br>• **IAEL**<br>• **SPEC Group Pakistan**<br>• **Callmate Telips**<br>• **Lahore Gymkhana**<br>• **Royal Palm**<br>• **Serena Hotel Islamabad**<br>• **Novatax Limited**<br>• **Hascom Business**<br>• **Excicom**<br>• **SB&B Advertising**<br>• **Polaris Values**<br>• **Raaziq International Pvt Ltd**<br>• **OOCL Pakistan**<br>• **Exel Pakistan**<br>• **DHL Pakistan**<br>• **Yaseen Shipping**<br>• **Karachi International Terminal Ltd**<br>• **Intertek Pakistan**<br>• **WWF Pakistan**<br>• **ESBI**<br>• **Merlin International Pakistan**<br>• **Arbor Tech**<br>• **Pak Oasis Industries Pvt. Ltd.**<br>• **OMV Exploration GmbH**<br>• **M3 Tech** |
| **No of Students** | 25 - 35 |
| **Learning Place** | **Classroom / Lab** |
| **Instructional Resources** | https://www.youtube.com/@iptrainers<br>https://www.youtube.com/@corvitsystemslahore |

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| | https://www.cisco.com/c/en/us/training-events/training- certifications.html<br>https://www.netacad.com/<br>https://skillsforall.com/<br>https://e.huawei.com/en/talent/portal/#/<br>https://learningcontent.cisco.com/games/binary/index.html<br>https://www.deakin.edu.au |

**DETAIL OF COURSE CONTENTS**

| Module Title | Learning Units | Task/Practical |
|---|---|---|
| **Introduction to Huawei Cloud & Architecture Design Methodology** | **Day 1**<br><br>**Fundamentals of Cloud Solution Architecture** | • Core Cloud Concepts and Service Models<br>• Cloud Architecture Design Principles<br>• Cloud Deployment Models and Security<br>• Huawei Cloud Services |
| | **Day 2**<br><br>**Huawei Cloud Architecture Design Framework** | • Huawei Cloud Architecture Core Layers<br>• Design Principles and Best Practices<br>• Industry-Specific Cloud Solutions |
| | **Day 3**<br><br>**Best Practices for Cloud Architecture Design** | • Design for Scalability and Elasticity<br>• Ensure Security and Compliance<br>• Optimize Cost and Performance |
| | **Day 4**<br><br>**Introduction to Huawei Well-Architected Framework and Application Migration Strategy** | • The Five Pillars explained<br>• How it guides Cloud architecture design<br>• Tie each pillar to design principle or decision-making process.<br>• Application migration Strategy and planning<br>• Huawei Migration Center walkthrough<br>Lab: Evaluate a sample architecture using WAF checklist |
| | **Day 5**<br><br>**Case Studies and Practical Application Scenarios** | • Real-World Cloud Architecture Case Studies<br>• End-to-End Solution Design Walkthroughs<br>• Troubleshooting and Optimization Scenario<br>• Lab 1: Navigating the Huawei Cloud Console (Explore the dashboard, locate services, and understand interface basics.) |
| **Cloud Infrastructure & Service System Design** | **Day 6**<br><br>**Overview of Huawei Cloud Infrastructure Components** | • Core Infrastructure Services<br>• Platform and Middleware Services<br>• Management, Security, and Monitoring Tools |
| | **Day 7**<br><br>**Designing Compute Service Systems** | • Selecting the Right Compute Services<br>• Architecture Design and Resource Allocation<br>• Performance Optimization and Cost Management |

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| | **Day 8**<br><br>**Designing Storage Service Systems** | • Understanding Storage Types and Use Cases<br>• Storage Architecture Design and Integration<br>• Performance, Security, and Cost Optimization |
| | **Day 9**<br><br>**Designing Network Service Systems** | • Core Networking Components and Architecture<br>• Connectivity and Access Management<br>• Network Performance and Security Optimization |
| | **Day 10**<br><br>**Case Study - End-to-End Infrastructure and Service Design** | • Business Requirements to Architecture Mapping<br>• Integrated Service Design and Deployment<br>• Evaluation, Optimization, and Scaling<br>• Lab 2: Initial Configuration of Core Infrastructure Components<br>(Configure VPCs, storage, and compute foundations to support upcoming labs.) |
| **Cloud Compute Solution Design** | **Day 11**<br><br>**Compute Service Overview and Selection Criteria** | • Overview of Compute Service Types<br>• Selection Criteria Based on Workload Needs<br>• Comparing Compute Options for Optimization |
| | **Day 12**<br><br>**Elastic Cloud Server (ECS) Design and Best Practices** | • ECS Architecture and Configuration<br>• High Availability and Scalability Design<br>• Security, Monitoring, and Cost Optimization |
| | **Day 13**<br><br>**Bare Metal Server (BMS) and Hybrid Compute Design** | • Understanding BMS and Its Use Cases<br>• Designing Hybrid Compute Architectures<br>• Management, Security, and Performance Optimization<br>• Lab 3: Deploying and Configuring ECS<br>(Create ECS instances, configure storage/network, enable HA.) |
| | **Day 14**<br><br>**Compute Elasticity and Auto-Scaling Design** | • Principles of Elastic Computing<br>• Auto-Scaling Architecture and Configuration<br>• Best Practices and Monitoring for Auto-Scaling<br>• Lab 4: Implementing Auto-Scaling<br>(Set thresholds and test ECS scaling groups.) |
| | **Day 15**<br><br>**Compute Design Case Study and Solution Review** | • Analyzing Business Requirements and Workload Characteristics<br>• Designing and Implementing the Compute Solution<br>• Reviewing Outcomes and Optimization Opportunities |

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| | | • Lab 5: Setting up a Hybrid Compute Environment (Set up BMS or simulated on-prem integration.) |
| **Cloud Storage Solution Design** | **Day 16**<br><br>**Overview of Cloud Storage Types and Use Cases** | • Types of Cloud Storage Services<br>• Use Cases for Each Storage Type<br>• Performance, Durability, and Cost Considerations |
| | **Day 17**<br><br>**Designing Object Storage Solutions (OBS)** | • Fundamentals of Object Storage<br>• Designing Scalable and Secure OBS Architectures<br>• Performance Optimization and Cost Management<br>• Lab 6: Working with OBS (Create/manage OBS buckets, set permissions, and lifecycle rules). |
| | **Day 18**<br><br>**Designing Block and File Storage Solutions** | • Understanding Block and File Storage<br>• Designing Scalable and Resilient Storage Solutions<br>• Performance Tuning and Cost Optimization<br>• Lab 7: Provisioning and Attaching Block/File Storage (Attach EVS/SFS to ECS and format/mount volumes) |
| | **Day 19**<br><br>**Data Protection, Backup, and Disaster Recovery in Storage** | • Data Protection Strategies<br>• Backup Solutions and Best Practices<br>• Disaster Recovery (DR) Planning<br>• Lab 8: Implementing Cloud Backup Solutions. (Configure backups for ECS or EVS, simulate recovery) |
| | **Day 20**<br><br>**Storage Solution Design Case Study and Review** | • Analyzing Business Needs and Storage Requirements<br>• Designing the Storage Solution<br>• Review and Optimization of the Storage Solution |
| **Cloud Network Architecture and Design** | **Day 21**<br><br>**Huawei Cloud Networking Overview and VPC Design** | • Introduction to Huawei Cloud Networking Components<br>• Designing and Configuring a VPC<br>• Security and Connectivity Best Practices |
| | **Day 22**<br><br>**Internet Access, NAT, and Elastic Load Balancing (ELB)** | • Internet Access and NAT Services<br>• Introduction to Content Delivery Network (CDNs)<br>• Elastic Load Balancing (ELB) Concepts and Use Cases<br>• Designing Secure and Scalable Network Access |
| | **Day 23**<br><br>**Private Connectivity – VPN, Direct Connect, and Cross-Region** | • VPN and Secure Remote Access<br>• Direct Connect for High-Performance Private Links<br>• Cross-Region and Inter-VPC Networking |

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| | **Networking** | • Lab 9: Designing and Configuring a VPC<br>(Create VPC, subnets, and security groups.) |
| | **Day 24**<br>**Network Security Design and DDoS Protection** | • Designing Secure Network Architectures<br>• DDoS Protection Services and Strategies<br>• Monitoring, Auditing, and Incident Response<br>• Lab 10: Implementing Internet Access, NAT, and Load Balancing<br>(Setup NAT gateways, Elastic IPs, ELB for ECS load balancing.) |
| | **Day 25**<br>**Network Solution Design Case Study and Optimization** | • Requirements Analysis and Network Architecture Design<br>• Implementation and Integration with Cloud Services<br>• Performance Review and Optimization Techniques<br>• Lab 11: Setting up VPN or Direct Connect<br>(Connect to on-prem or simulated local infrastructure securely.) |
| **Cloud Database Solution Design** | **Day 26**<br>**Overview of Huawei Cloud Database Services** | • Comprehensive Database Offerings<br>• High Performance and Scalability<br>• Security, Backup, and Management Tools |
| | **Day 27**<br>**Relational Database Design (RDS, GaussDB)** | • Core Concepts of Relational Design<br>• Huawei RDS and GaussDB Overview<br>• Design for Cloud Efficiency |
| | **Day 28**<br>**Distributed Database Middleware (DDM) Design** | • Introduction to DDM Architecture<br>• Sharding and Load Balancing Strategies<br>• High Availability and Transparent Management |
| | **Day 29**<br>**Distributed Database) Middleware (DDM) Design** | • Understanding NoSQL Models<br>• Design Principles for Big Data<br>• Huawei Cloud NoSQL & Big Data Solutions<br>• Lab 12: Deploying and Managing RDS<br>(Deploy MySQL/PostgreSQL, perform queries, backups.) |
| | **Day 30**<br>**Database Solution Design Case Study and Optimization** | • Real-World Case Study Analysis<br>• Performance and Cost Optimization<br>• Monitoring and Continuous Improvement<br>• Lab 13: Exploring NoSQL Services<br>(Use a NoSQL database, test CRUD operations.) |

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| **Cloud Security and Compliance Architecture** | **Day 31**<br>**Cloud Security Principles and Shared Responsibility Model** | • Core Cloud Security Principles<br>• Shared Responsibility Model Explained<br>• Implementing Best Practices |
| | **Day 32**<br>**Identity and Access Management (IAM) Design** | • IAM Fundamentals and Components<br>• Principle of Least Privilege<br>• IAM in Huawei Cloud |
| | **Day 33**<br>**Data Encryption, Protection, and Key Management** | • Encryption Basics and Types<br>• Data Protection Strategies<br>• Key Management Systems (KMS) |
| | **Day 34**<br>**Security Monitoring, DDoS Protection, and Compliance** | • Cloud Security Monitoring<br>• DDoS Protection Mechanisms<br>• Compliance and Regulatory Alignment<br>• Lab 14: Configuring IAM<br>(Set up IAM roles, users, and least-privilege policies.) |
| | **Day 35**<br>**Security Solution Case Study and Best Practice Review** | • Case Study Analysis<br>• Best Security Practices<br>• Post-Implementation Review<br>• Lab 15: Implementing Data Encryption<br>(Encrypt OBS and EVS using KMS, explore key rotation.) |
| **Cloud Operations & Maintenance (O&M) Design** | **Day 36**<br>**Cloud O&M Fundamentals and Monitoring Strategy** | • Cloud O&M Overview<br>• Monitoring Strategy Design<br>• Automated O&M and Incident Response |
| | **Day 37**<br>**Resource Usage, Billing, and Cost Optimization** | • Understanding Cloud Billing Models<br>• Cost Monitoring and Governance<br>• Resource Optimization Techniques<br>• Tracking Resource Usage<br>• Cost Optimization Techniques<br>Cost modeling exercises: on-prem vs. cloud |
| | **Day 38**<br>**Backup, Recovery, and Data Lifecycle Management** | • Backup and Recovery Strategies<br>• Data Lifecycle Management<br>• Cloud Backup Solutions and Tools |

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| | **Day 39**<br><br>**High Availability and System Maintenance Planning** | • High Availability (HA) Design Principles<br>• System Maintenance Best Practices<br>• Cloud-based HA and Maintenance Solutions<br>• Lab 16: Setting up Monitoring and Alarms<br>(Set up dashboards, alerts for CPU, memory, etc.) |
| | **Day 40**<br><br>**O&M Solution Case Study and Best Practices Review** | • Case Study Exploration<br>• O&M Best Practices<br>• Continuous Improvement and Review<br>• Lab 17: Simulating Backup and Recovery<br>(Simulate restore from backup for ECS/DB.) |
| **Distributed and Scalable System Architecture** | **Day 41**<br><br>**Principles of Distributed Systems in the Cloud** | • Principles of Distributed Systems in the Cloud<br>• Scalability and Fault Tolerance<br>• Data Consistency and CAP Theorem<br>• Distributed System Management and Monitoring |
| | **Day 42**<br><br>**Designing Scalable Compute and Storage Layers** | • Scalable Compute Design<br>• Storage Scalability and Performance<br>• Balancing Load and Cost |
| | **Day 43**<br><br>**Load Balancing and Traffic Distribution Strategies** | • Load Balancing Techniques<br>• How CDNs complement Load Balancers<br>• Edge caching Vs core distribution<br>• Traffic Distribution Models<br>• Fault Tolerance and High Availability<br>• Lab 18: Load Balancing and Traffic Distribution<br>(Advanced ELB features, service distribution strategies.)<br>• Optional Lab: Configuration and Testing Huawei Cloud CDN |
| | **Day 44**<br><br>**Event-Driven and Asynchronous Architecture Design** | • Event-Driven Architecture (EDA) Basics<br>• Asynchronous Communication and Workflow<br>• Designing for Scalability and Flexibility |
| | **Day 45**<br><br>**Distributed Architecture Case Study and Optimization** | • Case Study Analysis<br>• Optimization Strategies<br>• Continuous Monitoring and Refinement |

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| **Disaster Recovery (DR) and High Availability Design** | **Day 46**<br><br>**Principles of High Availability (HA) and DR in Cloud** | • High Availability (HA) in Cloud<br>• Disaster Recovery (DR) in Cloud<br>• HA and DR Integration in Cloud Environments |
| | **Day 47**<br><br>**Multi-AZ and Multi-Region Architecture Design** | • Multi-AZ Architecture Design<br>• Multi-Region Architecture Design<br>• Design Considerations for Scalability and Latency<br>• Lab 19: Deploying Across Multiple Azs<br>(Set up apps/resources across AZs for redundancy.) |
| | **Day 48**<br><br>**Backup and Recovery Planning for Critical Systems.** | • Backup Strategy Design<br>• Recovery Planning and Testing<br>• Cloud-based Backup Solutions<br>• Lab 20: Configuring Automated Failover<br>(Create a failover plan, simulate DB or ECS failure.) |
| | **Day 49**<br><br>**Automated Failover and Monitoring for DR Readiness** | • Automated Failover Mechanisms<br>• Monitoring for DR Readiness<br>• Integration of Failover and Monitoring in DR Plans |
| | **Day 50**<br><br>**DR and HA Solution Design Case Study** | • Case Study Analysis of DR and HA Design<br>• Key Design Decisions<br>• Lessons Learned and Best Practices |
| **Containers, Microservices, and Automation in Cloud Architecture** | **Day 51**<br><br>**Cloud-Native Concepts and Microservices Design Principles** | • Cloud-Native Architecture<br>• Microservices Design<br>• Best Practices for Microservices and Cloud-Native Development |
| | **Day 52**<br><br>**Huawei Cloud Container Engine (CCE) and Kubernetes Basics** | • Introduction to Kubernetes and CCE<br>• Container Orchestration with Kubernetes<br>• Using Huawei CCE for Efficient Management |
| | **Day 53**<br><br>**CI/CD Pipeline Design and DevOps Best Practices** | • CI/CD Pipeline Basics<br>• Designing an Effective CI/CD Pipeline<br>• DevOps Best Practices<br>• Lab 21: Deploying Apps with CCE<br>(Deploy a Dockerized app to CCE Kubernetes cluster.) |
| | **Day 54**<br><br>**Automation, Orchestration, and** | • Automation and Orchestration Principles<br>• Infrastructure as Code (IaC) Fundamentals<br>• Best Practices for Automation and IaC<br>• Lab 22: Building a CI/CD Pipeline |

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| | **Infrastructure as Code (IaC)** | (Build a cloud-based CI/CD pipeline (auto build, test, deploy)) |
| | **Day 55**<br><br>**Containerized Microservices Solution Case Study** | • Case Study Overview<br>• Implementation with Containers and Orchestration<br>• Challenges and Solutions<br>• Lab 23: Infrastructure as Code (IaC)<br>(Use Terraform or Huawei templates to provision cloud resources.) |
| **Capstone Project & Certification Preparation** | **Day 56**<br><br>**Capstone Project Scope Definition and Planning** | • Defining Project Scope<br>• Planning Methodology<br>• Risk Management and Contingency Planning |
| | **Day 57**<br><br>**Cloud Architecture Design and Documentation** | • Cloud Architecture Design Principles<br>• Choosing Cloud Services and Tools<br>• Documentation and Best Practices |
| | **Day 58**<br><br>**Project Deployment, Testing, and Optimization** | • Deployment Strategies<br>• Testing and Quality Assurance<br>• Optimization Techniques<br>• Lab 24: Capstone Project Implementation<br>(Full design, deploy, test of a cloud solution using multiple Huawei Cloud services) |
| | **Day 59**<br><br>**Certification Review - Key Topics and Practice Exam** | • Key Topic Review<br>• Practice Exam and Question Strategies<br>• Final Preparation Tips |
| | **Day 60**<br><br>**Final Project Presentation, Peer Review, and Exam Strategy** | • Final Project Presentation<br>• Peer Review and Feedback<br>• Peer Review Using WAF checklist<br>• Exam Strategy and Readiness |

**LIST OF MACHINERY / EQUIPMENT**

For the Class of 25 - 35 Students (3-Month Course)

| S. No | Name of Items | Quantity/Unit |
|---|---|---|
| 1. | Intel i5/i7, 32GB RAM, 250 GB SSD | 35 |
| 2. | High-Speed Internet Min 10 MB | 1 |
| 3. | Monitors (24-inch FHD/IPS) | 2 |
| 4. | Network Cabling & Accessories | As per actual |
| 5. | Backup Power Supply (UPS) | 1 |

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| 6. | Projector / Smart Display | 1 |
| 7. | Microphone & Speaker System | 1 |

**LIST OF CONSUMABLE MATERIAL**

For the Class of 25 - 35 Students (3-Month Course)

| S. No | Name of Items | Unit |
|---|---|---|
| 1. | Writing Notebooks | 30 |
| 2. | Pens (Blue/Black) | 60 |
| 3. | Markers (Whiteboard) | 10 |
| 4. | Whiteboard Dusters | 2 |
| 5. | Printing Paper (A4) | 5 Reams |
| 6. | File Folders | 30 |