

**COMPUTER NETWORKS (CY245AT)**

**Experiential Learning Report On**

# PROBLEM/PROJECT TITLE

Submitted by

# STUDENT NAME

**USN:**

#### Under the Guidance of

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**RV College of Engineering® Bengaluru - 560059**

***Submitted in partial fulfillment for the award of degreeof***

# BE CSE – Cyber Security

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

#### 2024-25

**(Autonomous Institution Affiliated to Visvesvaraya Technological University, Belagavi)**

#### DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

**Bengaluru– 560059**

## CERTIFICATE

Certified that the project work titled **“Title”** carried out by **name, USN:**, a bonafide student, submitted in partial fulfilment for the award of **BE** in **Computer Science and Engineering – Cyber Security** of **RV College of Engineering®, Bengaluru, affiliated to Visvesvaraya Technological University, Belagavi,** during the year **2024-25.** It is certified that all corrections/suggestions indicated for internal assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirement in respect of project work prescribed for the said degree.

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2**.**





**(Autonomous Institution Affiliated to Visvesvaraya Technological University, Belagavi)**

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**DECLARATION**

We, **names**, students of fourth semester **BE** in **Computer Science and Engineering – Cyber Security**, **Department of Computer Science and Engineering,** RV College of Engineering®, Bengaluru, declare that the Computer Networks Experiential Learning with title **“title”,** has been carried out by us. It has been submitted in partial fulfillment for the award of degree in **BE** in **Computer Science and Engineering-Cyber Security** of RV College of Engineering®, Bengaluru, affiliated to Visvesvaraya Technological University, Belagavi, during the academic year **2024-25**. The matter embodied in this report has not been submitted to any other university or institution for the award of any other degree or diploma.

**Date of Submission: Signature of the Student**

**Student Name:**

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Names USN’s

**ABSTRACT**

**Organise into 3 paragraphs**

**1st Paragraph – brief introduction 2nd Paragraph – detailed methodology 3rd Paragraph – conclude with results**

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# REFERENCES

1. S. An et al., "CloudSafe: A Tool for an Automated Security Analysis for Cloud Computing," 2019 18th IEEE International Conference On Trust, Security And Privacy In Computing And Communications/13th IEEE International Conference On Big Data Science And Engineering (TrustCom/BigDataSE), 2019, pp. 602-609, doi: 10.1109/TrustCom/BigDataSE.2019.00086.
2. P. Mishra, S. Kumar, U. Garg, E. S. Pilli and R. C. Joshi, "Security Perspectives of Various IoT Cloud Platforms: A Review & Case Study," 2021 International Conference on Computing, Communication, and Intelligent Systems (ICCCIS), 2021, pp. 727-731, doi: 10.1109/ICCCIS51004.2021.9397207.
3. A. Hendre and K. P. Joshi, "A Semantic Approach to Cloud Security and Compliance," 2015 IEEE 8th International Conference on Cloud Computing, 2015, pp. 1081-1084, doi: 10.1109/CLOUD.2015.157.
4. T. Alpcan and N. Bambos, "Modeling dependencies in security risk management," 2009 Fourth International Conference on Risks and Security of Internet and Systems (CRiSIS 2009), 2009, pp. 113-116, doi: 10.1109/CRISIS.2009.5411969.
5. M. Iorga and A. Karmel, "Managing Risk in a Cloud Ecosystem," in IEEE Cloud Computing, vol. 2, no. 6, pp. 51-57, Nov.-Dec. 2015, doi: 10.1109/MCC.2015.122.
6. V. Marbukh, "Systemic Risks in the Cloud Computing Model: Complex Systems Perspective," 2016 IEEE 9th International Conference on Cloud Computing (CLOUD), 2016, pp. 863-866, doi: 10.1109/CLOUD.2016.0124.
7. S. Ramjan, "Flexible security rule-based system on cloud service for e-travel agent," 2012 IEEE 2nd International Conference on Cloud Computing and Intelligence Systems, 2012,

pp. 298-302, doi: 10.1109/CCIS.2012.6664416.

1. P. Saripalli and B. Walters, "QUIRC: A Quantitative Impact and Risk Assessment Framework for Cloud Security," 2010 IEEE 3rd International Conference on Cloud Computing, 2010, pp. 280-288, doi: 10.1109/CLOUD.2010.22.
2. S. Schoenen, Z. A. Mann, and A. Metzger, “Using risk patterns to ´ identify violations of data protection policies in cloud systems,” in Service-Oriented Computing – ICSOC 2017 Workshops. Springer, 2017, pp. 296–307.
3. T. K. Damenu and C. Balakrishna, "Cloud Security Risk Management: A Critical Review," 2015 9th International Conference on Next Generation Mobile Applications,

Services and Technologies, 2015, pp. 370-375, doi: 10.1109/NGMAST.2015.25

1. V. Ahmadi, P. Arlos and E. Casalicchio, "Normalization Framework for Vulnerability Risk Management in Cloud," 2021 8th International Conference on Future Internet of Things and Cloud (FiCloud), 2021, pp. 99-106, doi: 10.1109/FiCloud49777.2021.00022.
2. A. Nhlabatsi et al., "Threat-Specific Security Risk Evaluation in the Cloud," in IEEE Transactions on Cloud Computing, vol. 9, no. 2, pp. 793-806, 1 April-June 2021, doi: 10.1109/TCC.2018.2883063.
3. P. Mishra, S. Kumar, U. Garg, E. S. Pilli and R. C. Joshi, "Security Perspectives of Various IoT Cloud Platforms: A Review & Case Study," 2021 International Conference on Computing, Communication, and Intelligent Systems (ICCCIS), 2021, pp. 727-731, doi: 10.1109/ICCCIS51004.2021.9397207.
4. M. Huang, "Design of basic process of information security risk assessment in cloud computing environment," 2021 IEEE International Conference on Consumer Electronics and Computer Engineering (ICCECE), 2021, pp. 494-499, doi: 10.1109

/ICCECE51280.2021.9342156.

1. T. R. Weil, "Standards for Cloud Risk Assessments - What's Missing?," 2020 IEEE Cloud Summit, 2020, pp. 11-17, doi: 10.1109/IEEECloudSummit48914.2020.00008.
2. W. Wu, Q. Zhang and Y. Wang, "Public Cloud Security Protection Research," 2019 IEEE International Conference on Signal Processing, Communications and Computing (ICSPCC), 2019, pp. 1-4, doi: 10.1109/ICSPCC46631.2019.8960734.
3. S. An et al., "CloudSafe: A Tool for an Automated Security Analysis for Cloud Computing," 2019 18th IEEE International Conference On Trust, Security And Privacy In Computing And Communications/13th IEEE International Conference On Big Data Science And Engineering (TrustCom/BigDataSE), 2019, pp. 602-609, doi: 10.1109/TrustCom/BigDataSE.2019.00086.
4. F. Kunz and Z. Á. Mann, "Finding Risk Patterns in Cloud System Models," 2019 IEEE 12th International Conference on Cloud Computing (CLOUD), 2019, pp. 251-255, doi: 10.1109/CLOUD.2019.00051.
5. T. Weil, "Risk Assessment Methods for Cloud Computing Platforms," 2019 IEEE 43rd Annual Computer Software and Applications Conference (COMPSAC), 2019, pp. 545-547, doi: 10.1109/COMPSAC.2019.00083.
6. V. Malik and S. Singh, "Cloud, Big Data & IoT: Risk Management," 2019 International Conference on Machine Learning, Big Data, Cloud and Parallel Computing (COMITCon), 2019, pp. 258-262, doi: 10.1109/COMITCon.2019.8862445.
7. A. Nhlabatsi, J. B. Hong, D. S. Kim, R. Fernandez, N. Fetais and K. M. Khan, "Spiral^SRA: A Threat-Specific Security Risk Assessment Framework for the Cloud," 2018 IEEE International Conference on Software Quality, Reliability and Security (QRS), 2018, pp. 367-374, doi: 10.1109/QRS.2018.00049.
8. Yogeshwaran Sivasubramanian, Syed Zubair Ahmed, Ved Prakash Mishra, “Risk Assessment for Cloud Computing”, International Research Journal of Electronics and Computer Engineering, [S.l.], v. 3, n. 2, p. 7-9, June 2017. ISSN 2412-4370.
9. A. Hendre and K. P. Joshi, "A Semantic Approach to Cloud Security and Compliance," 2015 IEEE 8th International Conference on Cloud Computing, 2015, pp. 1081-1084, doi: 10.1109/CLOUD.2015.157.
10. D. N. Jha and D. P. Vidyarthi, "A heuristic for security prioritized resource provisioning in cloud computing," 2015 IEEE UP Section Conference on Electrical Computer and Electronics (UPCON), 2015, pp. 1-6, doi: 10.1109/UPCON.2015.7456728.
11. S. K. Madria, "Security and Risk Assessment in the Cloud," in Computer, vol. 49, no. 9, pp. 110-113, Sept. 2016, doi: 10.1109/MC.2016.280.
12. C. Lim and A. Suparman, "Risk analysis and comparative study of the different cloud computing providers in Indonesia," 2012 International Conference on Cloud Computing and Social Networking (ICCCSN), 2012, pp. 1-5, doi: 10.1109/ICCCSN.2012.6215714.
13. A. S. Sendi and M. Cheriet, "Cloud Computing: A Risk Assessment Model," 2014 IEEE International Conference on Cloud Engineering, 2014, pp. 147-152, doi: 10.1109/IC2E.2014.17.
14. J. Zhang, D. Sun and D. Zhai, "A research on the indicator system of Cloud Computing Security Risk Assessment," 2012 International Conference on Quality, Reliability, Risk, Maintenance, and Safety Engineering, 2012, pp. 121-123, doi: 10.1109/ICQR2MSE.2012.6246200.
15. Y. Ben Charhi, N. Mannane, E. Bendriss and B. Regragui, "Intrusion detection in cloud computing based attacks patterns and risk assessment," 2016 Third International Conference on Systems of Collaboration (SysCo), 2016, pp. 1-4, doi: 10.1109/SYSCO.2016.7831341.
16. Mei Li and M. Bardi, "A risk assessment method of cloud computing based on multi- level fuzzy comprehensive evaluation," International Conference on Cyberspace Technology (CCT 2014), 2014, pp. 1-4, doi: 10.1049/cp.2014.1377.
17. Y. Jianxing, C. Haicheng, W. Shibo and F. Haizhao, "A Novel Risk Matrix Approach Based on Cloud Model for Risk Assessment Under Uncertainty," in IEEE Access, vol. 9,

pp. 27884-27896, 2021, doi: 10.1109/ACCESS.2021.3058392.

1. O. Akinrolabu, S. New and A. Martin, "Assessing the Security Risks of Multicloud SaaS Applications: A Real-World Case Study," 2019 6th IEEE International Conference on Cyber Security and Cloud Computing (CSCloud)/ 2019 5th IEEE International Conference on Edge Computing and Scalable Cloud (EdgeCom), 2019, pp. 81-88, doi: 10.1109/CSCloud/EdgeCom.2019.00-14.
2. Z. Li, Z. Tang, J. Lv, H. Li, W. Han and Z. Zhang, "An information security risk assessment method for cloud systems based on risk contagion," 2020 IEEE 5th Information Technology and Mechatronics Engineering Conference (ITOEC), 2020, pp. 83-87, doi: 10.1109/ITOEC49072.2020.9141852.
3. N. V. Juliadotter and K. -K. R. Choo, "Cloud Attack and Risk Assessment Taxonomy," in IEEE Cloud Computing, vol. 2, no. 1, pp. 14-20, Jan.-Feb. 2015, doi: 10.1109/MCC.2015.2.
4. K. Djemame, D. Armstrong, J. Guitart and M. Macias, "A Risk Assessment Framework for Cloud Computing," in IEEE Transactions on Cloud Computing, vol. 4, no. 3, pp. 265-278, 1 July-Sept. 2016, doi: 10.1109/TCC.2014.2344653.
5. A. Devgun, "A rule based mathematical model to improve risk assessment on cloud server," 2014 International Conference on Electronics, Communication and Computational Engineering (ICECCE), 2014, pp. 226-231, doi: 10.1109/ICECCE.2014.7086617.
6. N. Mannane, Y. Bencharhi, B. Boulafdour and B. Regragui, "Survey: Risk assessment models for cloud computing: Evaluation criteria," 2017 3rd International Conference of Cloud Computing Technologies and Applications (CloudTech), 2017, pp. 1-5, doi: 10.1109/CloudTech.2017.8284712.
7. M. T. Nguyen and P. B. Khorev, "Information risks in the cloud environment and cloud-based secure information system model," 2019 International Youth Conference on Radio Electronics, Electrical and Power Engineering (REEPE), 2019, pp. 1-6, doi: 10.1109/REEPE.2019.8708845.
8. S. Tanimoto et al., "A Study of Risk Assessment Quantification in Cloud Computing," 2014 17th International Conference on Network-Based Information Systems, 2014, pp. 426-431, doi: 10.1109/NBiS.2014.11.
9. E. Mostajeran, M. N. M. Mydin, M. F. Khalid, B. I. Ismail, R. Kandan and O. H. Hoe, "Quantitative risk assessment of container based cloud platform," 2017 IEEE Conference on Application, Information and Network Security (AINS), 2017, pp. 19-24, doi: 10.1109/AINS.2017.8270418.
10. M. Kiran, M. Jiang, D. J. Armstrong and K. Djemame, "Towards a Service Lifecycle Based Methodology for Risk Assessment in Cloud Computing," 2011 IEEE Ninth International Conference on Dependable, Autonomic and Secure Computing, 2011, pp. 449-456, doi: 10.1109/DASC.2011.89.
11. O. Wenge, D. Schuller and R. Steinmetz, "Towards Establishing Security-Aware Cloud Markets," 2014 IEEE 6th International Conference on Cloud Computing Technology and Science, 2014, pp. 1027-1032, doi: 10.1109/CloudCom.2014.159.
12. C. Chih and Y. Huang, "An Adjustable Risk Assessment Method for a Cloud System," 2015 IEEE International Conference on Software Quality, Reliability and Security - Companion, 2015, pp. 115-120, doi: 10.1109/QRS-C.2015.27.
13. E. Cayirci, A. Garaga, A. Santana and Y. Roudier, "A Cloud Adoption Risk Assessment Model," 2014 IEEE/ACM 7th International Conference on Utility and Cloud Computing, 2014, pp. 908-913, doi: 10.1109/UCC.2014.148.
14. B. Charhi Youssef, B. Elmehdi, M. Nada and R. Boubker, "Implementation Approach for IDS based on Risk Assessment and Attack Pattern in Cloud Computing," 2018 International Conference on Control, Automation and Diagnosis (ICCAD), 2018, pp. 1-5, doi: 10.1109/CADIAG.2018.8751361.
15. A. Aich, A. Sen and S. R. Dash, "A Survey on Cloud Environment Security Risk and Remedy," 2015 International Conference on Computational Intelligence and Networks, 2015, pp. 192-193, doi: 10.1109/CINE.2015.45.
16. A. U. Khan, M. Oriol, M. Kiran, M. Jiang and K. Djemame, "Security risks and their management in cloud computing," 4th IEEE International Conference on Cloud Computing Technology and Science Proceedings, 2012, pp. 121-128, doi: 10.1109/CloudCom.2012.6427574.
17. G. S. C. Kumar, D. Prasad, V. S. Rao and N. R. Sai, "Utilization of Nominal Group Technique for Cloud Computing Risk Assessment and Evaluation in Healthcare," 2021

Third International Conference on Inventive Research in Computing Applications (ICIRCA), 2021, pp. 927-934, doi: 10.1109/ICIRCA51532.2021.9544895.

1. M. Masky, S. S. Young and T. Choe, "A Novel Risk Identification Framework for Cloud Computing Security," 2015 2nd International Conference on Information Science and Security (ICISS), 2015, pp. 1-4, doi: 10.1109/ICISSEC.2015.7370967.
2. M. Theoharidou, N. Papanikolaou, S. Pearson and D. Gritzalis, "Privacy Risk, Security, Accountability in the Cloud," 2013 IEEE 5th International Conference on Cloud Computing Technology and Science, 2013, pp. 177-184, doi: 0.1109/CloudCom.2013.31.
3. A. Benfateh, F. Gharnati and T. Agouti, "ISA-based model for risk assessment in cloud computing environment," 2016 5th International Conference on Multimedia Computing and Systems (ICMCS), 2016, pp. 377-383, doi: 10.1109

/ICMCS.2016.7905613.

1. N. E. El-Attar, W. A. Awad and F. A. Omara, "Empirical assessment for security risk and availability in public Cloud frameworks," 2016 11th International Conference on Computer Engineering & Systems (ICCES), 2016, pp. 17-25, doi: 10.1109

/ICCES.2016.7821969.