CERTIFICATE

This is to certify that the bonafide record of project work entitled the **"PROSAS: PROACTIVE SECURITY AUDITING SYSTEM FOR CLOUDS"**, submitted to Bharathiar University , in partial fulfillment of the requirements for the award of the degree in Bachelor of Science in Computer Science is the original record work done by **PAUL ROBINSON.A (Reg. No: 2022K2646)** under my supervision and guidance under this project has not formed basis for the award of any Degree/ Diploma/ Association/ Fellowship or other similar title to any university.

Guide   **Head of the Department**

Submitted for Viva- Voce Examination held on _____

Internal Examiner   **External Examiner**

i

DECLARATION

I , **PAUL ROBINSON.A** hereby declare that the project, entitled in the name of **"PROSAS: PROACTIVE SECURITY AUDITING SYSTEM FOR CLOUDS"** submitted to Bharathiar University, in partial fulfillment of the requirements for the award of degree of Bachelor of Science in Computer Science is a record of original and independent work done by me during 2022-2023 under the supervision and guidance of **Dr.T. SURESHKUMAR MCA., M.Phil., Ph.D., M.Sc., PGDCA., D.T.Ed** Head of Department of Computer Science, Government Arts and Science College, Gudalur, and it has not formed the basis for the award of any Degree/ Diploma/ Association/ Fellowship or similar title to any candidate of any University.

Place: Gudalur

Date: **Signature of the Candidate**

ACKNOWLEDGEMENT

The   satisfaction and ecstasy that accompany the successful completion of a task would be incomplete without mentioning the persons , who made it possible, whose constant assistance, guidance and encouragement crowded my efforts with success.

I wish to express my thanks to **The Principal,Dr.R.RAJENDIRAN MA., M.Phil., Ph.D.** Government Arts & Science College ,Gudalur ,for having given an opportunity for taking up the project.

I   am   thankful   to , Head   of   the   department   of   Computer   Science **Dr.T. SURESHKUMAR MCA., M.Phil., Ph.D., M.Sc., PGDCA., D.T.Ed ,** for being an inspiration throughout the project.

I   take   this   opportunity   to   express   my   gratitude   to   my   guide   of   this   project , **Dr.T. SURESHKUMAR MCA., M.Phil., Ph.D., M.Sc., PGDCA., D.T.Ed,** Head of the Department of Computer   Science , Government Arts   and   Science College , Gudalur for   his valuable   guidance ,encouragement   and   keen interest in completion of my project.

I take this opportunity to offer my gratitude to My Family Members and Friends who encouraged me to produce this result.

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Thanking You

PAUL ROBINSON.A

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CONTENTS

SYNOPSIS

The multi-tenancy in a cloud along with its dynamic and self-service nature could cause severe security concerns, such as isolation breaches among cloud tenants. To mitigate such concerns and ensure the accountability and transparency of the cloud providers towards their tenants, verifying cloud states against a list of security policies, a.k.a. security auditing, is a promising solution. However, the existing security auditing solutions for clouds suffer from several limitations. First, the traditional auditing approach, which is retroactive in nature, can only detect violations after the fact and hence, often becomes ineffective while dealing with the dynamic nature of a cloud. Second, the existing runtime approaches can cause significant delay in the response time while dealing with the sheer size of a cloud. Finally, the current proactive approaches typically rely on prior knowledge about future changes in a cloud and also require significant manual efforts, and thus become less practical for a dynamic environment like cloud. To address those limitations, we present a novel proactive security auditing system, namely, ProSAS, which can prevent violations to security policies at runtime with a practical response time, and yet does not require prior knowledge about future changes. More specifically, ProSAS first establishes its models (e.g., dependency relationships between cloud events, and critical events) through learning from historical data (e.g., logs); it then predicts future critical events which would likely follow a received event by leveraging the dependency relationships; afterwards, it proactively verifies the impacts of those future events, and prevents those events which can cause violations of security policies. ProSAS is integrated into OpenStack, a popular cloud management platform, and we provide a concrete guideline to port ProSAS to other popular cloud platforms, such as Google Cloud Platform, and Amazon EC2. Our experiment results using both real and synthetic data demonstrate the improvement of efficiency (i.e., reducing response time to 1,450 nanoseconds at best and 8.5 milliseconds on average for a large-scale cloud with 10,000 tenants) and level of automation (i.e., learning more than 20 new critical events spanning 100 days) in proactive security auditing by ProSAS.