

BIG-ABAC Test Scenarios Overview

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1 Introduction

this document presents the evaluation of the BIG-ABAC system which focuses on four critical performance dimensions: flexibility, scalability, latency, and traceability. These dimensions are essential for determining the system's suitability in dynamic healthcare environments, particularly during emergencies. Each dimension is assessed across 15 test scenarios designed to reflect real-world conditions. In this section, we compare BIG-ABAC with related work, specifically the AC-ABAC framework [15], to highlight the advantages of our solution.

2 Performance Evaluation

The system was evaluated through 15 scenarios, with each scenario assessing different contextual attributes such as time, location, role, and emergency session status, ensuring that access control policies are enforced accurately based on real-time conditions.

BIG-ABAC manages role changes dynamically and in real time by leveraging its policy adaptation mechanisms and context-aware decision-making capabilities. The system's ability to seamlessly incorporate role changes into its access control decisions is crucial for maintaining flexibility and security in fast-paced environments.

Table 1: Test Scenarios Overview

Scenario	Description	Rules Applied	Outcome	End-to-End Latency
S1	A cardiologist in the active ES team requests to read EMR within the authorized time period.	R1, R2, R3, R4, R5, R6	PERMIT	45ms
S2	A cardiologist in the active ES team requests to read EMR outside the authorized time period.	R1, R2, R3, R4, R6, R5 (not satisfied)	DENY	27ms
S3	An anesthetist in the active ES team requests to update EMR within the authorized time period.	R1, R2, R3, R4, R5, R7, R8	PERMIT	41ms
S4	A general physician not in the ES team requests to update EMR during an emergency.	R1, R3, R5, R7, R2 (not satisfied)	DENY	33ms
S5	An emergency physician who did not start the ES attempts to end the session.	R1, R2, R3, R4, R10 (not satisfied)	DENY	36ms
S6	A nurse attempts to start an emergency session.	R1, R2 (not satisfied)	DENY	44ms
S7	A cardiologist in the active ES team attempts to read EMR without patient consent.	R1, R2, R4, R5, R6, R3 (not satisfied)	DENY	65ms
S8	An emergency physician in an ambulance requests to update EMR while en route to the hospital.	R1, R2, R3, R4, R5, R7, R8	PERMIT	38ms
S9	An emergency physician attempts to access EMR from an unauthorized location.	R1, R2, R3, R4, R5, R6 (not satisfied)	DENY	27ms
S10	An emergency physician attempts to end the ES while the emergency condition is still active.	R2, R3, R4, R1 (not satisfied)	DENY	49ms
S11	An emergency physician attempts to update EMR after the authorized time period has ended.	R1, R2, R3, R4, R5 (not satisfied), R7, R8	DENY	33ms
S12	A healthcare professional tries to start an ES without the required specialty.	R1, R9 (not satisfied)	DENY	36ms
S13	An emergency physician requests to update the EMR from an unauthorized device or IP address.	R1, R2, R3, R4, R5, R6 (not satisfied), R7, R8	DENY	27ms
S14	A cardiologist who started the ES attempts to end the ES with all other rules satisfied.	R1, R2, R3, R4, R10	PERMIT	49ms
S15	An unauthorized professional attempts to end the ES.	R1, R2 (not satisfied), R3, R4, R10	DENY	44ms