BROKER ARCHITECTURE PATTERN

STUDENT'S NAME

COURSE

DATE

INTRODUCTION

- THE BROKER ARCHITECTURAL PATTERN IS USED TO CREATE DISTRIBUTED SOFTWARE SYSTEMS WITH DECOUPLED COMPONENTS THAT COMMUNICATE WITH ONE OTHER VIA REMOTE PROCEDURE CALLS.
- IT'S ALSO KNOWN AS THE PUBLISH - SUBSCRIBE PATTERN.
- THE BROKER ARCHITECTURE PATTERN PROVIDES A SCALABLE AND ADAPTABLE ANSWER TO THE ISSUES THAT COMPLEX APPLICATIONS FACE.

LITERATURE REVIEW

- **APUKHTIN, V., SHIROKOPETLEVA, M., & SKOVORODNIKOVA, V. 2019. THE RELEVANCE OF USING MESSAGE BROKERS IN ROBUST ENTERPRISE APPLICATIONS. IN PROCEEDINGS OF THE 2019 IEEE INTERNATIONAL SCIENTIFIC-PRACTICAL CONFERENCE PROBLEMS OF INFOCOMMUNICATIONS, SCIENCE AND TECHNOLOGY (PIC S&T), IEEE, OCTOBER, 305-309.**
- THE BROKER ARCHITECTURAL PATTERN AIDS IN THE DECOUPLING OF COMPONENTS WITHIN THE SAME SYSTEM.
- THIS ENABLES AUTONOMOUS DEVELOPMENT AND DEPLOYMENT. IT IS RELEVANT IN MODERN SOFTWARE DEVELOPMENT BECAUSE OF ITS CAPACITY TO MEET CONTEMPORARY SOFTWARE DEVELOPMENT DIFFICULTIES

- **[2] S. VYAS, R. K. TYAGI, C. JAIN, AND S. SAHU. 2021. LITERATURE REVIEW: A COMPARATIVE STUDY OF REAL-TIME STREAMING TECHNOLOGIES AND APACHE KAFKA. IN PROCEEDINGS OF THE 2021 FOURTH INTERNATIONAL CONFERENCE ON COMPUTATIONAL INTELLIGENCE AND COMMUNICATION TECHNOLOGIES (CCICT), IEEE, JULY 2021, 146-153.**
- BROKER ARCHITECTURAL PATTERNS HAVE VARIOUS APPLICATIONS IN MODERN SOFTWARE DEVELOPMENT. THEY'RE EMPLOYED IN THE CREATION OF MESSAGE BROKERS LIKE APACHE KAFKA AND RABBITMQ

METHODOLOGY

- . TO GATHER KNOWLEDGE ON THE SUBJECT, SEVERAL PUBLICATIONS WERE EVALUATED.
- . A THOROUGH SEARCH WAS CARRIED OUT IN VARIOUS ACADEMIC DATABASES, INCLUDING SPRINGER AND GOOGLE SCHOLAR.
- DATA EXTRACTION ENTAILED GATHERING INFORMATION FROM THE SELECTED ARTICLES, INCLUDING MAJOR FINDINGS, METHODOLOGY USED, AND TRENDS RELEVANT TO THE BROKER ARCHITECTURE PATTERN

- **QUALITY ASSESSMENT** - A QUALITY ASSESSMENT WAS PERFORMED TO DETERMINE THE LEGITIMACY AND DEPENDABILITY OF THE CHOSEN LITERATURE. THE QUALITY OF THE STUDY TECHNIQUE, THE SIGNIFICANCE OF THE FINDINGS, AND THE REPUTATION OF THE PUBLISHED VENUES WERE ALL ASPECTS EVALUATED IN THE EVALUATION. THIS PHASE WAS DESIGNED TO IMPROVE THE OVERALL VALIDITY OF THE SYNTHESIZED DATA.
- **LIMITATIONS** - IT IS CRITICAL TO RECOGNIZE THE POTENTIAL LIMITS OF THE SLR METHODOLOGY. DESPITE EFFORTS TO INCLUDE A WIDE RANGE OF LITERATURE, THE REVIEW REMAINS DEPENDENT ON THE AVAILABILITY AND ACCESSIBILITY OF RELEVANT PAPERS. FURTHERMORE, THE SUBJECTIVE CHARACTER OF THE INCLUSION AND EXCLUSION CRITERIA PROMOTES SUBJECTIVITY.

RELEVANCE OF BAP

- **DECOUPLING AND ENCAPSULATION.**
- **DECOUPLING** - THE DEGREE TO WHICH SYSTEM COMPONENTS ARE AUTONOMOUS AND DO NOT RELY ON EACH OTHER'S INTERNAL DETAILS IS REFERRED TO AS DECOUPLING. IT IS THE PROCESS OF ELIMINATING DEPENDENCIES BETWEEN VARIOUS COMPONENTS OF A SOFTWARE SYSTEM.
- **ENCAPSULATION -** ENCAPSULATION IS THE PROCESS OF COMBINING DATA (ATTRIBUTES OR PROPERTIES) AND METHODS (FUNCTIONS OR PROCEDURES) THAT OPERATE ON THE DATA INTO A SINGLE ENTITY, COMMONLY REFERRED TO AS A CLASS IN OBJECT-ORIENTED PROGRAMMING.

SCALABILITY AND FLEXIBILITY

- **SCALABILITY** - THE ABILITY OF A SYSTEM TO ACCOMMODATE AN INCREASING QUANTITY OF WORKLOAD OR DATA BY ADDING RESOURCES WITHOUT AFFECTING PERFORMANCE IS REFERRED TO AS SCALABILITY. A SCALABLE SYSTEM CAN EFFICIENTLY HANDLE INCREASES IN USER DEMAND, DATA VOLUME, OR TRANSACTION FREQUENCY.
- **FLEXIBILITY** - THE EASE WITH WHICH A SYSTEM MAY ADAPT TO CHANGES IN REQUIREMENTS, TECHNOLOGY, OR EXTERNAL CIRCUMSTANCES IS REFERRED TO AS FLEXIBILITY IN SOFTWARE ARCHITECTURE. A VERSATILE SYSTEM CAN BE EASILY ADJUSTED OR EXPANDED WITHOUT CAUSING MAJOR INTERRUPTIONS.

EVENT – DRIVEN PARADIGM

- THE EVENT-DRIVEN PARADIGM IS A PROGRAMMING PARADIGM THAT FOCUSES ON EVENT OCCURRENCE AND EVENT HANDLING.
- THE FLOW OF THE PROGRAM IS DICTATED BY EVENTS LIKE AS USER ACTIONS (CLICKS, KEYPRESSES), SENSOR OUTPUTS, OR MESSAGES FROM OTHER PROGRAMS OR COMPONENTS IN THIS PARADIGM.
- EVENT-DRIVEN PROGRAMMING IS POPULAR IN GRAPHICAL USER INTERFACE (GUI) APPLICATIONS, REAL-TIME SYSTEMS, AND SYSTEMS THAT MUST RESPOND TO EXTERNAL INPUTS.

CHALLENGES

- WHILE THE BROKER ARCHITECTURE PATTERN HAS MANY ADVANTAGES, IT ALSO HAS SOME DRAWBACKS THAT DEVELOPERS AND ARCHITECTS MUST CONSIDER. UNDERSTANDING THESE PROBLEMS IS CRITICAL FOR SUCCESSFUL IMPLEMENTATION AND THE DEVELOPMENT OF ROBUST, DEPENDABLE SYSTEMS.
- COMPLEXITY.
- PERFORMANCE.
- SECURITY.
- MESSAGE ORDERING.

CONCLUSION

IN CURRENT SOFTWARE DEVELOPMENT, THE BROKER ARCHITECTURE PATTERN IS CRITICAL. ITS CHARACTERISTICS SUCH AS DECOUPLING, SCALABILITY, AND FLEXIBILITY ALLOW IT TO BE USED IN A VARIETY OF APPLICATIONS. THE BROKER ARCHITECTURE PATTERN ENABLES SCALABILITY OF SUCH SYSTEMS WITH THE USE OF CLOUD COMPUTING. THIS ENSURES THAT THEY CAN SUCCESSFULLY HANDLE COMMUNICATION BETWEEN EACH DISPERSED COMPONENT.

THE ABILITY TO UPDATE A SINGLE COMPONENT WITHOUT HAVING TO CHANGE ALL OF THE OTHER COMPONENTS IS CRITICAL IN SUCH SYSTEMS SINCE IT ALLOWS FOR FLEXIBILITY. FINALLY, DESPITE ITS APPLICATIONS, IT INTRODUCES NEW OBSTACLES, SUCH AS INCREASED COMPLEXITY. HOWEVER, PROPER THOUGHT AND PLANNING CAN HELP TO ALLEVIATE THESE DIFFICULTIES.

REFERENCES

- [1] APUKHTIN, V., SHIROKOPETLEVA, M., & SKOVORODNIKOVA, V. 2019. THE RELEVANCE OF USING MESSAGE BROKERS IN ROBUST ENTERPRISE APPLICATIONS. IN PROCEEDINGS OF THE 2019 IEEE INTERNATIONAL SCIENTIFIC-PRACTICAL CONFERENCE PROBLEMS OF INFOCOMMUNICATIONS, SCIENCE AND TECHNOLOGY (PIC S&T), IEEE, OCTOBER, 305-309.
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