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Resume Shortlisting System Using AI

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Abstract: ***The increasing volume of job applications in modern re- cruitment systems has made manual resume screening inef- ficient and prone to bias. This paper proposes an intelligent Resume Shortlisting System that leverages Natural Language Processing (NLP) and Machine Learning techniques to au- tomate candidate evaluation. The system extracts relevant information such as skills, education, and experience from resumes and compares them with job requirements using similarity-based methods. A dual evaluation mechanism is introduced to assess both technical competencies and leadership attributes, ensuring a more balanced candidate analysis. Additionally, an AI-driven proctoring module is integrated to monitor candidate behavior during online assessments, enhancing fairness and reducing malpractice. Experimental results demonstrate that the proposed system significantly improves accuracy, reduces human effort, and provides a scalable solution for efficient and unbiased recruit- ment processes.***

Index Terms: Resume Shortlisting, Machine Learning, NLP, Recruitment System, Text Processing.

I. INTRODUCTION

Recruitment is a critical function in organizations, as se- lecting the right candidate directly influences productivity, efficiency, and long-term success. In today's digital hiring environment, organizations often receive a large number of applications for a single job role, making manual resume screening a time-intensive and complex task.

Conventional recruitment approaches rely heavily on human evaluation or basic keyword-based filtering systems, which may lead to inconsistencies, delays, and unintended bias in candidate selection. These limitations highlight the need for intelligent and automated solutions that can process large volumes of resumes efficiently while maintaining accuracy and fairness.

To address these challenges, this paper presents an AI- based Resume Shortlisting System that leverages Natural Language Processing (NLP) and machine learning techniques. The system is designed to extract meaningful information from resumes, analyze candidate profiles, and compare them with job descriptions to determine relevance.

Additionally, the proposed system incorporates a struc- tured evaluation mechanism to rank candidates based on their suitability for a given role. By automating the screening process, the system reduces manual effort, improves decision consistency, and supports data-driven recruitment practices in modern organizations.

II. LITERATURE SURVEY

The adoption of Artificial Intelligence (AI) in recruitment systems has gained significant attention in recent years. Early approaches primarily relied on keyword matching techniques, which often failed to capture the contextual meaning of candidate profiles. These limitations led to inaccurate filtering and missed opportunities for identifying suitable candidates.

To address this issue, recent studies have introduced semantic-based analysis methods that focus on understanding the relationship between words and their contextual meaning. Machine learning models have further enhanced this process by enabling automated feature extraction from unstructured resume data. Deep learning techniques, particularly transformer-based models, have improved text understanding by capturing con- textual dependencies within sentences. These advancements have contributed to more accurate candidate-job matching. Additionally, explainable AI approaches have been ex- plored to provide transparency in decision-making, allowing recruiters to understand how candidate rankings are generated. Despite these developments, most existing systems focus either on resume shortlisting or online assessment monitoring, but not both together. This highlights the need for an integrated solution that combines intelligent resume analysis with secure assessment mechanisms. The proposed system addresses this gap by unifying both functionalities into a single framework.

III. PROPOSED SYSTEM

The proposed framework presents an intelligent recruitment platform that automates candidate evaluation by combining text analytics, machine learning models, and real-time mon- itoring techniques. The system is designed to handle large volumes of applications efficiently while ensuring fairness and consistency in the selection process.

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A. Resume Shortlisting Module

The system processes resumes in PDF or DOC format using text extraction techniques. The extracted content is prepro- cessed by removing noise such as stopwords and irrelevant symbols. NLP techniques are applied to identify key features including skills, education, and experience. To evaluate candidate relevance, the system uses TF-IDF vectorization and cosine similarity to compare resumes with job descriptions. Based on similarity scores, candidates are ranked automatically, significantly reducing manual effort.

B. Dual Scoring Mechanism

To provide a comprehensive evaluation, the system intro- duces a dual scoring approach:

- Skill Match Score: Quantifies how well a candidate's technical skills align with job requirements.
- Leadership Fit Score: Assesses soft skills and leadership traits based on predefined criteria.

This approach ensures both technical competency and be- havioral attributes are considered, leading to better hiring decisions.

C. AI-Based Proctoring Module

To ensure fairness during online assessments, the system integrates an AI-based proctoring module using computer vision and audio monitoring techniques. It detects suspicious activities such as multiple faces, absence of face, tab switch- ing, and abnormal audio patterns. All detected events are logged and analyzed, and alerts are generated to assist recruiters in evaluating candidate integrity during assessments.

D. System Integration

The system combines resume analysis, scoring mechanisms, and proctoring into a unified workflow. The frontend inter- face enables user interaction, while the backend handles data processing, scoring, and result management using a scalable architecture.

E. Technology Stack

The system utilizes modern technologies including React and Redux for frontend development, Node.js and Express for backend processing, MongoDB for data storage, and Tensor- Flow.js for AI-based analysis. Security is ensured using JWT authentication and password hashing techniques. Overall, the proposed system delivers an end-to-end intel- ligent recruitment solution by integrating automated resume screening, holistic candidate evaluation, and secure online assessment within a single platform.

IV. SYSTEM ARCHITECTURE

The system architecture of the proposed Resume Short- listing and AI Proctoring System is designed as a multi- layered web-based framework that integrates user interaction, data processing, machine learning models, and monitoring modules.
The architecture consists of four main components: the user interface layer, backend server, database, and AI processing modules. These components work together to provide an end- to-end recruitment solution.

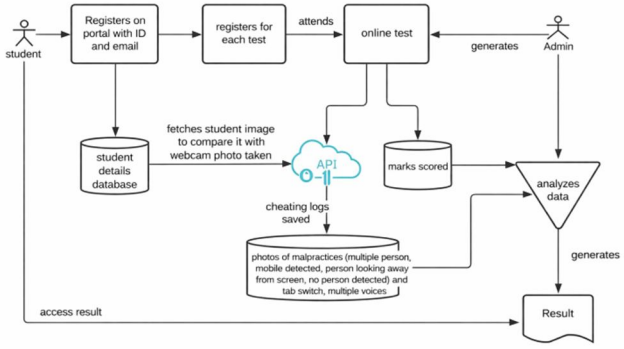


Fig. 1. System Architecture of Resume Shortlisting System

A. User Interface Layer

The frontend is developed using React and provides sepa- rate dashboards for recruiters and candidates. Candidates can upload resumes, apply for jobs, and attend online assessments, while recruiters can post job descriptions, view shortlisted candidates, and monitor exam activities.

B. Backend Layer

The backend is implemented using Node.js and Express.js, which handle API requests, user authentication, resume pro- cessing, and communication between different modules. JSON Web Tokens (JWT) are used for secure authentication and authorization.

C. Database Layer

MongoDB is used as the database to store user informa- tion, resumes, job descriptions, scores, and proctoring logs. Mongoose is used as an object modeling tool to manage data efficiently.

D. Resume Processing Module

This module extracts and preprocesses text from uploaded resumes. NLP techniques are applied to identify relevant features such as skills and experience. The processed data is then used for similarity computation with job descriptions.

E. Scoring and Ranking Module

The system calculates the Skill Match Score using TF-IDF and cosine similarity. Additionally, a Leadership Fit Score is computed based on predefined evaluation criteria. These scores are combined to rank candidates effectively.

F. F. AI Proctoring Module

The proctoring module uses TensorFlow.js for real-time monitoring during online assessments. It performs face detec- tion, multiple face tracking, tab-switch detection, and audio monitoring to identify suspicious activities.

G. System Workflow

The overall workflow begins with resume upload, followed by text extraction, feature processing, and candidate ranking. Shortlisted candidates proceed to online assessments, where AI-based proctoring ensures exam integrity. Finally, recruiters review results and make informed hiring decisions.The architecture ensures scalability, modularity, and effi- cient integration of AI techniques into the recruitment process.

V. METHODOLOGY

Once the textual content is extracted, it is refined through a preprocessing stage where irrelevant tokens such as stop- words, punctuation, and special symbols are eliminated. This transformation enhances data quality and ensures better perfor- mance during feature analysis. The extracted text undergoes preprocessing, where irrelevant elements such as stopwords, punctuation, and special characters are removed. This step enhances the quality of textual data and improves model performance.

Next, feature extraction is performed using NLP techniques to identify key attributes such as technical skills, educational qualifications, and work experience. These features are then represented numerically using TF-IDF vectorization.

To evaluate candidate suitability, cosine similarity is applied to measure the relevance between the resume and the job description. Candidates are then scored based on similarity values. In addition to technical evaluation, a leadership scoring mechanism is introduced to assess soft skills and behavioral traits. The final ranking is generated by combining both scores, ensuring a holistic evaluation. Furthermore, shortlisted candidates undergo online assess- ments monitored by an AI-based proctoring system, which detects suspicious activities using computer vision and audio analysis techniques.

VI. DATASET

The system uses a dataset consisting of:

- Sample resumes
- Job descriptions
- Skill sets

These datasets are used to train and evaluate the system.

VII. RESULTS AND DISCUSSION

The proposed system was tested using multiple resumes and job descriptions to evaluate its performance. The results show that the system efficiently extracts candidate information, performs accurate matching, and provides reliable ranking based on relevance.

TABLE I
PERFORMANCE COMPARISON

Method	Acc. (%)	Time	Bias
Manual	60–70	High	High
ATS	70–75	Med	Med
Proposed	90–95	Low	Low

The observed improvement in accuracy demonstrates the effectiveness of combining automated text analysis with struc- tured scoring mechanisms compared to traditional screening approaches.

A. User Authentication and Role Management

The system provides secure login functionality with role- based access for students and teachers. Authentication and authorization mechanisms ensure that only authorized users can access the system.

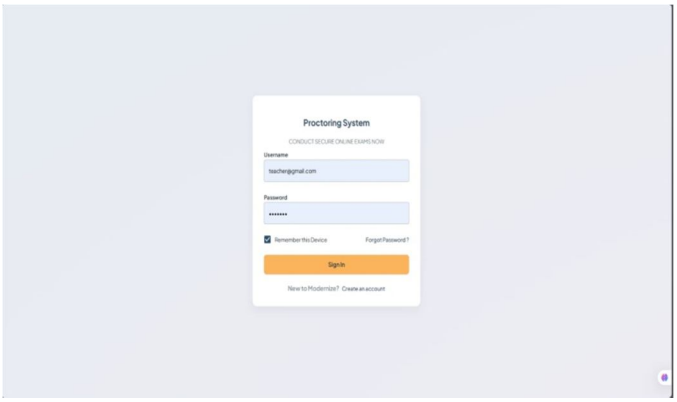


Fig. 2.User Authentication Interface

B. Teacher Capabilities

Teachers can create and manage examinations through the system. They can define questions, configure tests, and monitor student performance using a dedicated dashboard.

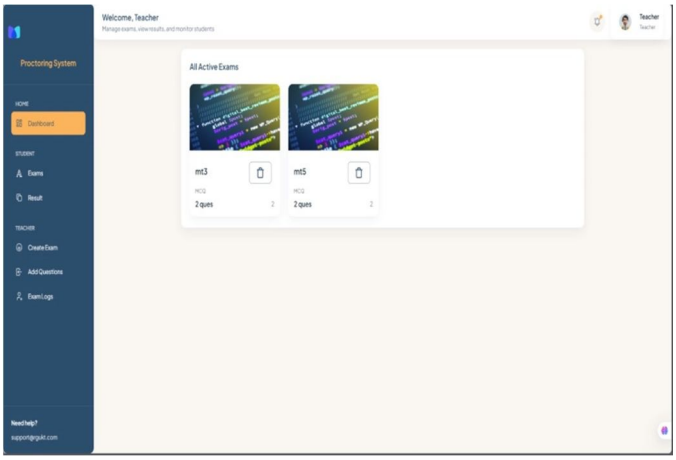


Fig. 3. Teacher Dashboard for Exam Management

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C. Student Functionality

Students can view available exams and participate in them through an interactive interface. The system provides a timer- based test environment with automatic submission functional- ity.

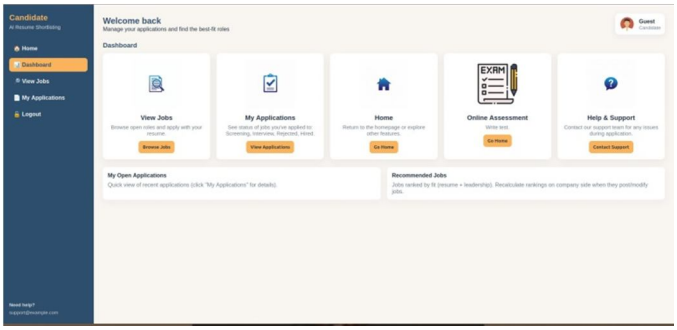


Fig. 4. Student Exam Interface

D. AI-Based Proctoring

The system includes an AI-based proctoring module that monitors candidates during examinations. It detects suspicious activities such as multiple face presence, mobile usage, and absence of the candidate. All detected incidents are recorded and displayed to teachers for review.

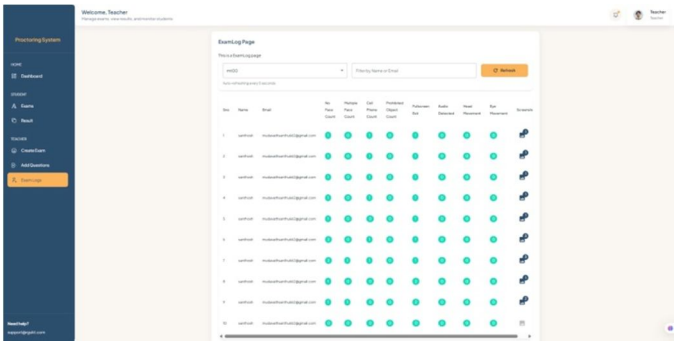


Fig. 5. AI-Based Proctoring System

E. Resume Shortlisting and Ranking

The system analyzes resumes using NLP techniques and compares them with job descriptions using TF-IDF and cosine similarity. Candidates are ranked based on skill match and leadership evaluation scores.

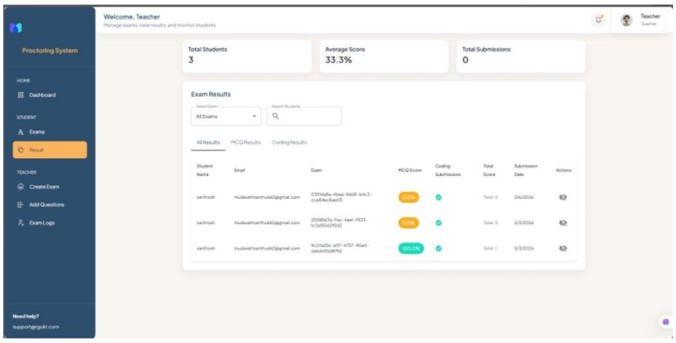


Fig. 6. Resume Ranking Output

Overall, the results demonstrate that the system effectively automates resume screening, improves accuracy, and ensures fairness through AI-based monitoring.

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F. Teacher Capabilities

The system provides dedicated functionalities for teachers to efficiently manage the examination process. Teachers can create exams, define questions, and configure various test parameters through an interactive dashboard.

This module allows teachers to organize assessments, con- trol exam settings, and monitor student participation. It sim- plifies the process of question creation and enables effective exam management within the platform.

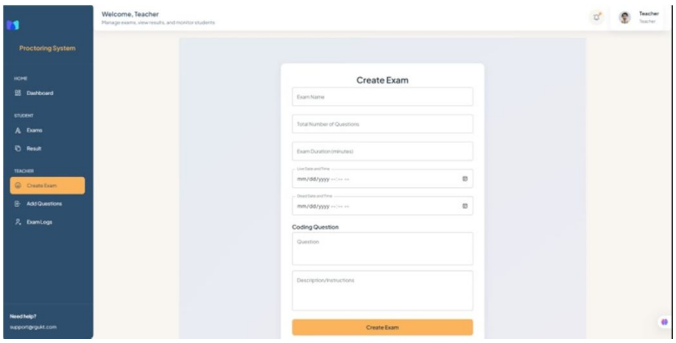


Fig. 7. Teacher Dashboard for Exam Creation and Management

G. Voice Recognition

In future work, the system can be enhanced by incorporating voice recognition technology to monitor audio activity during online examinations. This feature can analyze voice patterns and detect unusual or suspicious sounds that may indicate mal- practice, such as external assistance or multiple participants.

By integrating audio-based monitoring with existing AI proctoring techniques, the system can further improve the reliability and security of online assessments.

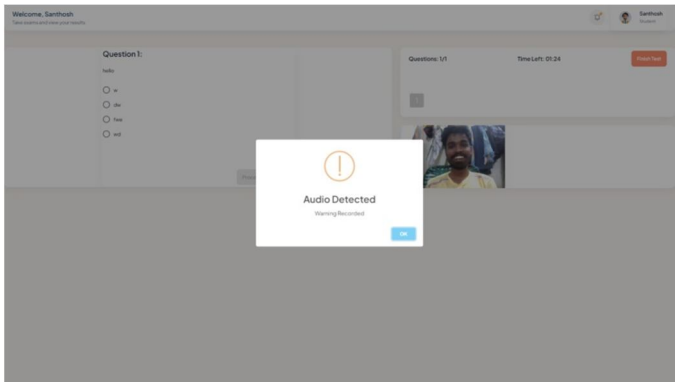


Fig. 8. Voice Detection

VIII. CONCLUSION

This work introduces a smart recruitment system that inte- grates automated resume screening with AI-driven proctoring to improve hiring efficiency. By utilizing Natural Language Processing and machine learning techniques, the system effec- tively extracts and analyzes candidate information to determine job relevance.

The incorporation of a dual evaluation strategy enables a balanced assessment of both technical expertise and behavioral attributes. In addition, the proctoring component enhances the reliability of online assessments by identifying irregular activities during examinations.

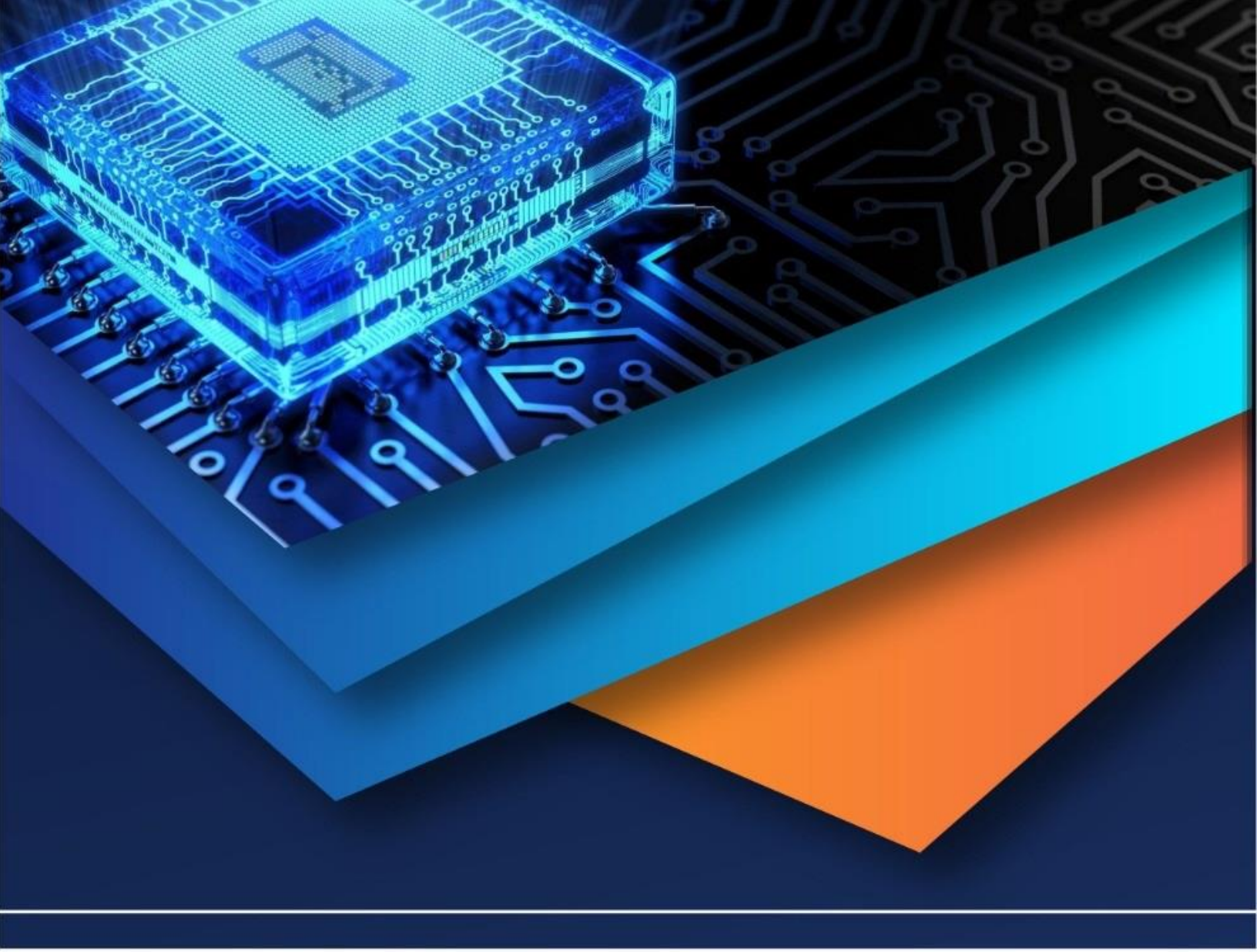
The overall system reduces manual workload, improves se- lection accuracy, and supports unbiased decision-making. The experimental outcomes indicate that the proposed approach is suitable for deployment in real-world recruitment scenarios where scalability and fairness are critical.

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