

A Competency Based Recruitment Mechanism using Cognitive Taxonomy and Vectorization Techniques

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ABSTRACT a competency-based recruitment platform designed to address the limitations of traditional resume-driven hiring systems. In existing recruitment processes, candidates often rely on self-declared skills and unverifiable credentials, leading to inefficiencies, bias, and incorrect hiring decisions. This paper proposes a skill-first hiring system where candidates are evaluated through structured assessments and are issued verified certificates based on their actual performance. The system integrates skill testing, certification, job matching, and hiring analytics into a unified platform. Employers can utilize intelligent metrics such as hiring confidence score, risk score, and role fit index to make data-driven decisions. The platform reduces dependency on resumes and enables fair opportunities for candidates, especially freshers, to prove their abilities. Additionally, it improves hiring accuracy, reduces recruitment time, and enhances transparency in the hiring process. Future enhancements include AI-based recommendation systems and blockchain-enabled certificate verification for global trust. Devourtise aims to create a scalable, unbiased, and efficient hiring ecosystem driven by real skill validation.

Keywords : Skill-Based Hiring, Competency Assessment, Recruitment System, Intelligent Candidate Matching, Verified Certification, Hiring Analytics, Data-Driven Recruitment, Bias-Free Hiring, Skill Validation, Online Assessment Platform

1. INTRODUCTION

In the modern job market, the gap between candidate skills and hiring decisions has become increasingly significant. Traditional recruitment systems primarily rely on resumes, academic qualifications, and keyword-based screening methods, which often fail to accurately represent a candidate's real-world abilities.

As a result, many skilled individuals, particularly fresh graduates and self-learners, struggle to prove their competencies, while organizations face challenges in identifying the right talent efficiently.

The existing hiring ecosystem is largely dependent on self-declared information, making it difficult for recruiters to verify the authenticity of skills. This leads to issues such as resume fraud, biased hiring decisions based on educational background, and increased time spent on screening and interviews. Consequently, companies experience reduced hiring accuracy and higher recruitment costs.

To address these challenges, there is a growing need for a skill-first hiring approach that focuses on validated performance rather than claimed qualifications. A system that integrates skill assessment, certification, and job matching into a single platform can significantly improve transparency, trust, and efficiency in recruitment.

This paper introduces Devourtise, a competency-based hiring platform designed to bridge the gap between job seekers and job creators through verified skill evaluation and intelligent matching. The platform enables candidates to demonstrate their abilities through structured assessments and earn performance-based certificates, while employers gain access to reliable, data-driven insights for better hiring decisions. By shifting the focus from resumes to real skill validation, Devourtise aims to create a fair, efficient, and scalable recruitment ecosystem. Devourtise addresses this need by creating a dynamic platform that aligns candidate capabilities with evolving job market requirements.

2. LITERATURE REVIEW

Saraswarthi and Murugavel (2024) proposed a skill-based job recommendation system using GBM- XGBoost, showing improved accuracy in matching candidates to roles, but lacking full hiring workflow integration.

Leela and Naren (2025) introduced a knowledge graph-based skill recommender system, highlighting structured skill mapping, but without real-time certification and validation.

Hassan and Iqbal (2022) discussed cloud-based recruitment platforms for scalable hiring; however, these systems still rely on traditional resume filtering. Lee and Kim (2022) presented a data-driven hiring system using analytics to support decisions, but without integrating skill testing and certification.

Patil and Joshi (2022) emphasized competency-based evaluation models that improve hiring accuracy, though not directly linked to recruitment workflows. Wang and Zhao (2021) explored machine learning for candidate-job matching, but noted that lack of verified data affects prediction reliability.

Alenezi and Mahmood (2020) developed intelligent recruitment systems using data analytics, yet lacked transparency in skill validation.

Thus, existing systems focus on isolated solutions, whereas Devourtise provides an integrated platform combining skill assessment, certification, and hiring for improved accuracy and transparency.

3. METHODOLOGY

3.1 Requirement Analysis

Stakeholders :

- Job Seekers (Candidates), Job Creators (Companies), and Administrators.

Functional Requirements :

- Candidate registration, login, and skill selection.
- Conducting skill-based assessments with scoring and result generation.
- Automatic certificate generation based on performance.
- Job posting by companies with required skill criteria.
- Intelligent candidate filtering and job matching.
- Application submission and status tracking.

Non-Functional Requirements :

- Security (JWT authentication, data encryption).
- Scalability (support large number of users and job listings).
- Reliability (high availability and minimal downtime).

3.2 Transparency (verified certificates and audit logs).

3.3 System Design

1. Login Module:



- Users (candidates/companies) register and log in using email or mobile number.
- Credentials are validated securely using authentication mechanisms.

2. Authentication Module:

- Secure login is implemented using JWT-based authentication.
- OTP/email verification is used for account validation and security.

3. Skill Assessment Module:

- Candidates select role and skill, then attend structured online tests.
- System evaluates performance based on accuracy, time, and attempts.

4. Certification Module:

- Certificates are automatically generated based on test scores.
- Each certificate includes score, level, category, and unique ID for verification.

5. Job Matching Module:

- Companies post jobs with required skills and criteria.
- System matches candidates based on skill scores and eligibility.

6. Hiring Intelligence Module:

- Displays metrics such as hiring confidence score, risk score, and role-fit index.
- Helps recruiters make data-driven decisions.

7. Application Module:

- Candidates apply for jobs using their skill passport and profile.
- Application status is tracked (applied, shortlisted, interview, selected).

8. Data Storage & Security:

- All data is securely stored using databases with encryption.
- Ensures privacy, integrity, and secure access control.

9. Admin Module:

- Admin manages users, skill tests, job postings, and system monitoring.
- Ensures smooth operation and system performance.

3.4 Implementation Steps

1. Frontend Development:

- Built using React.js, HTML, CSS, and JavaScript.
- User-friendly interfaces for login, skill tests, dashboards, and job applications.

2. Backend Development:

- Developed using Java (Spring Boot) or Node.js for handling business logic.
- APIs created for authentication, skill assessment, certificate generation, and job matching.

3. Database Management:

- PostgreSQL is used to store user data, test results, certificates, and job details.
- ORM tools like Hibernate or Prisma ensure efficient data handling.

4. Security Layer:

- JWT-based authentication for secure login and session management.
- Password encryption using BCrypt and role-based access control (RBAC).

5. Testing:

- Unit testing, integration testing, and API testing performed.
- Ensures system reliability, performance, and bug-free operation.

6. Deployment:

- Hosted on cloud platforms such as AWS or GCP.
- Secured using HTTPS and SSL/TLS encryption for safe communication.

4. SYSTEM ARCHITECTURE

The architecture of Devourtise consists of the following layers:

1. User Interface Layer

- Candidate, company, and admin interaction through web or mobile applications.
- Built using HTML, CSS, JavaScript, and React.js.
- Provides responsive and user-friendly dashboards for all users.

2. Application Layer

- Handles business logic such as authentication, skill testing, certificate generation, and job matching.
- Developed using Java (Spring Boot) or Node.js.

3. Authentication Layer

- Implements secure login using JWT-based authentication.
- Supports OTP/email verification for additional security.
- Role-Based Access Control (RBAC) ensures proper user permissions.

4. Database Layer

- Stores user data, skill test results, certificates, job postings, and applications using PostgreSQL.
- Ensures data integrity and efficient data retrieval.

5. Intelligence Layer

- Uses Python-based analytics to calculate skill scores, hiring confidence, and role-fit index.
- Supports data-driven hiring decisions.

6. Security Layer

- Implements encryption, secure APIs, and access control mechanisms.
- Ensures data privacy, system reliability, and protection against unauthorized access.

5. DATA FLOW DIAGRAM (DFD)

User → Registration/Login → Role & Skill Selection

→ Skill Assessment → Score Evaluation → Certificate Generation → Skill Passport → Job Matching

→ Job Application → Hiring Process.

6. SYSTEM DESIGN

Entity Relationship Diagram (ERD) Entities:

Candidate, Company, Skill Test, Score, Certificate, Job, Job Application, Admin.

Relationships:

Candidate attends → Skill Test. Skill Test generates → Score.

Score produces → Certificate. Company creates → Job.

Candidate applies → Job Application. Job Application belongs to → Job.

Admin manages → Candidates, Companies, and Jobs.

7. WORKPLAN

OVERALL SYSTEM FLOW

1. Candidate (Job Seeker) → Skill Test → Certificate → Job Apply

2. Company (Job Creator) → Job Posting → Filter, Compare & 1 to 1 Interview → Hire

3. Admin → Monitor → Improve System

Candidate Website Flow

Site 01: Candidate login / Register Page

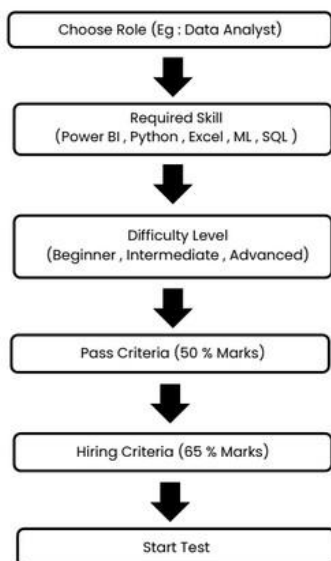
Login Page :

Email / Mobile :

Password :

The Candidate Login/Register page enables users to securely access the platform using their email or mobile number and password. New users can create an account by providing basic details, ensuring easy onboarding.

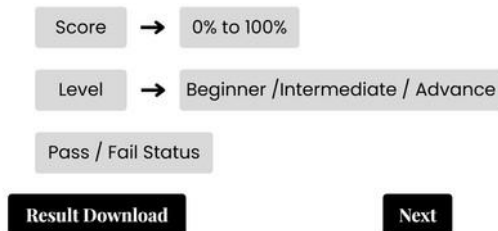
Site 2: Onboarding Page (Role and Skill Selection Page)



The Onboarding Page allows candidates to select their desired job role and relevant skills before taking the assessment. Based on the selected skill, the system defines the difficulty level along with pass and hiring criteria. This step ensures that candidates are evaluated according to industry-specific requirements.

The Skill Test Page enables candidates to take structured assessments with features such as a timer, question panel, and auto-save functionality. Candidates can submit their responses upon completion, and the system evaluates performance instantly. This module ensures accurate measurement of skills based on real-time performance.

Site 4: Result Page

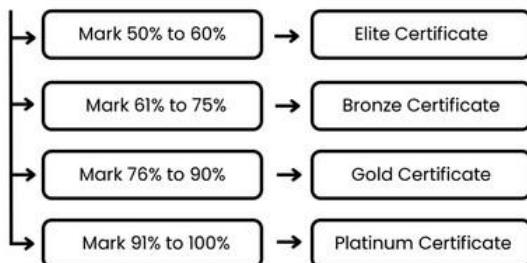


The Result Page shows the candidate's score, skill level, and pass/fail status. It provides a quick evaluation and allows users to download results and proceed further.

Site 5: Certificate Page

If pass

Certificate Criteria



The Certificate Page issues performance-based certificates categorized as Elite, Bronze, Gold, or Platinum. It provides verified proof of the candidate's skills.

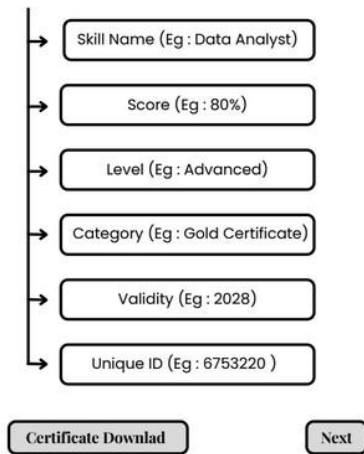
Site 3: Skill Test Page

- 1. Timer
- 2. Question / Task Panel
- 3. Submit Button
- 4. Auto-Save



The Certificate Auto Generator creates certificates with details such as skill name, score, level, category, validity, and a unique ID. It ensures standardized and verifiable certification. Users can download the certificate for official use.

Certificate Auto Generator



Site 6 : Passport Page

Shows :

- All Certificates
- Skill Time Line
- Growth Indicators

Passport :

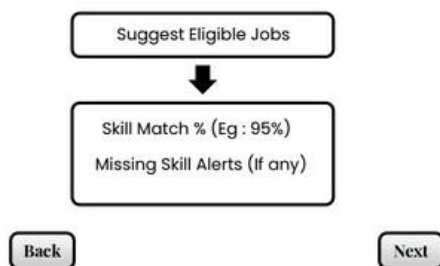
- Shareable
- Immutable
- Verifiable



The Passport Page displays all certificates, skill timeline, and growth indicators of the candidate. It acts as a shareable and verifiable digital profile. This ensures a complete and trusted representation of the candidate's skills.

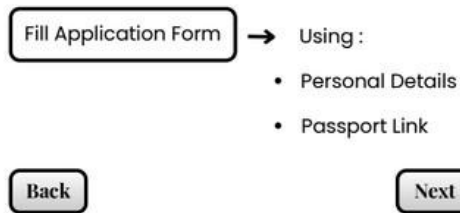
Site 7 : Job Portal Page

- Job Portal Unlock Automatically
- System Shows



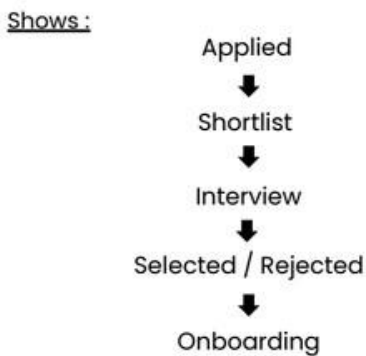
The Job Portal Page automatically unlocks and displays eligible job opportunities for candidates. It shows skill match percentage and highlights missing skills if any. This helps candidates understand their readiness and apply for suitable roles.

Site 8: Job Application Page



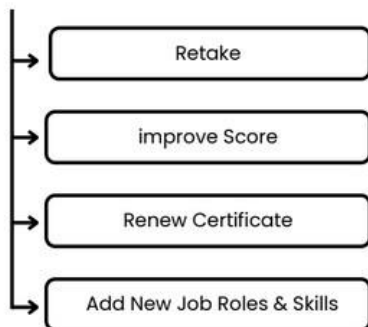
The Job Application Page allows candidates to apply for jobs by filling out required details. Applications are submitted using personal information and the skill passport link. This ensures a streamlined and verified application process.

Site 9: Application Status Page



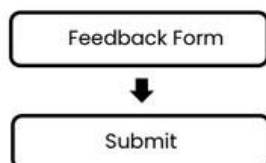
The Application Status Page tracks the progress of job applications through stages such as applied, shortlisted, interview, and final selection. It provides real-time updates to candidates. This ensures transparency and keeps users informed throughout the hiring process.

Site 10: Skill Upgrade Page



The Skill Upgrade Page allows candidates to retake tests, improve scores, and renew certificates. It also enables adding new skills and job roles. This supports continuous learning and career growth.

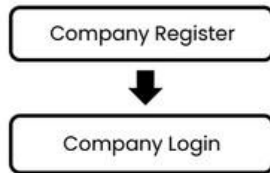
Site 11: Feedback Page



The Feedback Page allows users to share their experience and suggestions through a feedback form. Submitted feedback helps improve system performance and user satisfaction.

7.1 Company Website Flow

Site 1: Company Onboarding Page



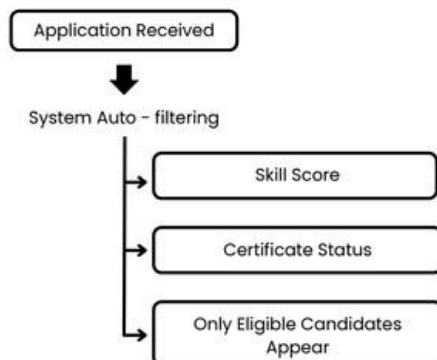
The Company Onboarding Page allows organizations to register and log in to the platform. It provides secure access for companies to manage job postings and hiring activities.

Site 2: Company Job Posting Page



The Company Job Posting Page enables organizations to create job listings by defining roles, job details, and required skills. This helps in attracting suitable candidates based on specific requirements.

Site 3: Job Application Auto Filtering Page



The Job Application Auto Filtering Page processes received applications and filters candidates automatically. It evaluates based on skill score and certificate status, displaying only eligible candidates. This reduces manual effort and speeds up the hiring process.

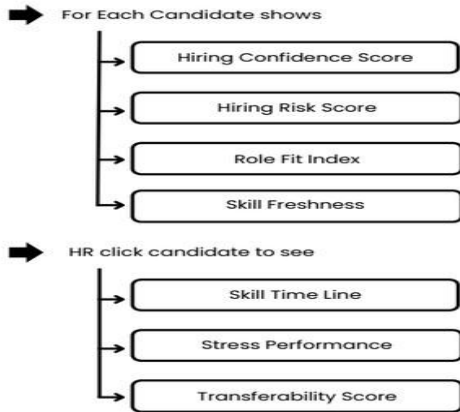
Site 6: Interview Management Page

HR Schedules Interviews



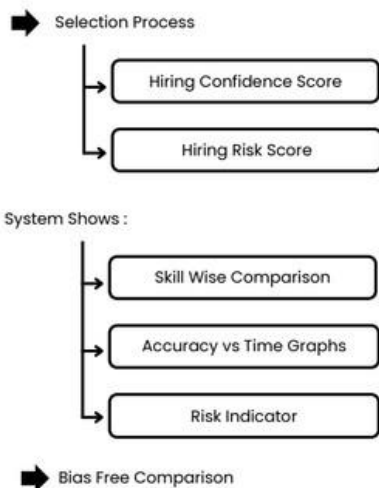
1 to 1 Interview

Site 4: Decision Intelligence View Page



The Decision Intelligence View Page provides detailed analytics for each candidate, including hiring confidence, risk score, and role fit index. It also shows deeper insights like skill timeline and performance metrics. This helps recruiters make informed and data-driven hiring decisions.

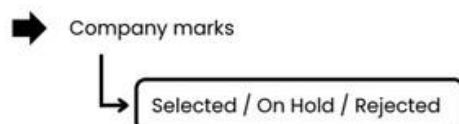
Site 5: Candidate Comparison Page



The Candidate Comparison Page allows recruiters to compare candidates based on hiring confidence and risk scores. It provides insights like skill-wise comparison and performance graphs. This ensures a fair and bias-free selection process.

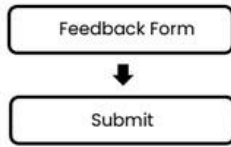
The Interview Management Page allows HR to schedule and manage interviews for shortlisted candidates. It supports one-to-one interview sessions. This streamlines the final stage of the hiring process.

Site 7: Hiring decision Page



The Hiring Decision Page allows companies to finalize candidate outcomes as selected, on hold, or rejected. It ensures clear and structured decision-making. This marks the final step in the recruitment process.

Site 8 : Company Feedback Page



The Company Feedback Page allows recruiters to provide feedback on the hiring process. Submitted feedback helps improve system performance and decision-making.

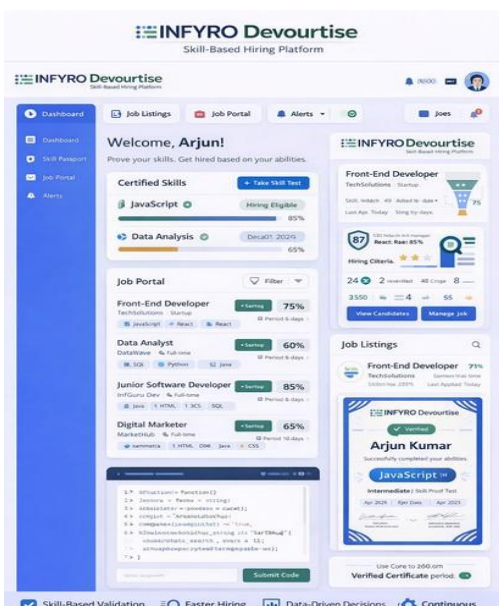
8. ALGORITHM STUDY

```
BEGIN
Authenticate(Candidate_ID, Login_Credentials)
IF Authentication_Success = TRUE THEN
    Select_Role_And_Skill()
    Start_Skill_Test()
    Evaluate_Performance()
    Generate_Certificate()
    Display_Eligible_Jobs()
    Apply_For_Job()
    Display_Application_Status()
ELSE
    Display "Authentication Failed"
END IF
END
```

9. TESTING & VALIDATION

Unit Testing: Individual modules such as login, skill assessment, and certificate generation were tested independently to ensure correct functionality.

Integration Testing: Verified seamless data flow between modules including authentication, assessment, and job matching.

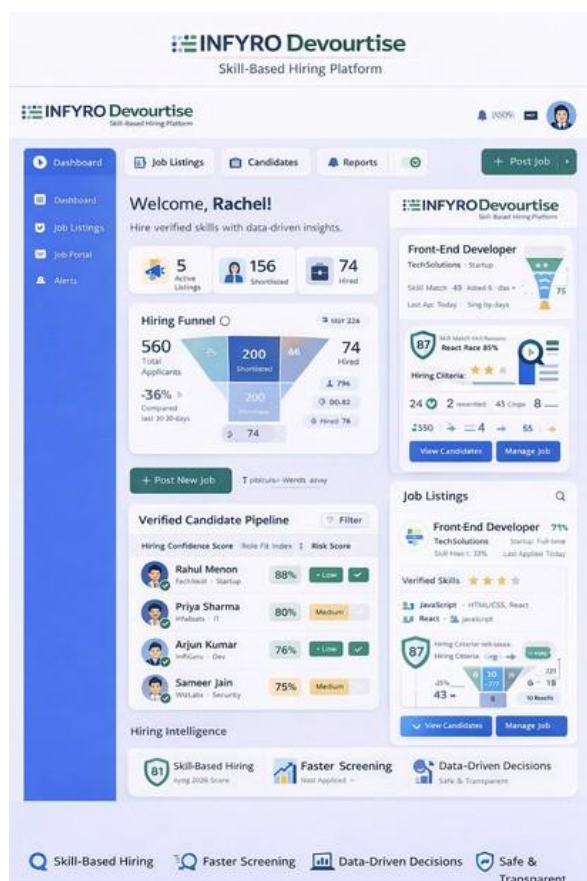


Security Testing: Tested for vulnerabilities such as SQL injection and ensured secure authentication and data protection mechanisms.

Performance Testing: Evaluated system performance under high load conditions to ensure scalability and reliability.

10. EXPECTED OUTCOME

The Candidate Dashboard provides a personalized interface for users to track their skill progress and job opportunities. It displays certified skills with performance scores, eligibility status, and options to take new skill tests. The job portal section recommends relevant roles based on skill match percentage and highlights required technologies. Additionally, the dashboard includes a digital skill passport and verified certificates, enabling candidates to showcase their competencies. This interface ensures a seamless experience for skill validation, job discovery, and application management, supporting a skill-driven hiring approach.



The Company Dashboard provides a comprehensive view of hiring activities, including job listings, candidate pipeline, and recruitment analytics. It presents key metrics such as active listings, shortlisted candidates, hiring count, and skill match percentages. The system also visualizes the hiring funnel and candidate performance through confidence scores, risk indicators, and role fit index. Additionally, it enables recruiters to manage job postings, compare candidates, and make efficient, data-driven hiring decisions with improved accuracy and reduced screening time.

11. SYSTEM FEATURES

Skill-Based Hiring: Evaluates candidates through practical assessments instead of resumes.

Verified

Certification: Provides authentic, performance-based certificates.

Intelligent Job Matching: Recommends jobs based on skill match and eligibility.

Hiring Analytics: Uses metrics like confidence score and role fit index.

Skill Passport: Displays verified skills and growth in a shareable format.

Automated Filtering: Shortlists candidates based on skill scores.

Secure & Scalable: Ensures data security and supports large user base.

12. COMPARATIVE STUDY

Feature	Traditional Hiring	Devourtise System
Evaluation Method	Resume-based	Skill-based assessment
Skill Validation	Self-declared	Verified certification
Screening Process	Manual	Automated filtering
Hiring Decision	Experience & background	Data-driven analytics
Transparency	Limited	High (skill proof system)
Time Taken	Days/Weeks	Faster (instant filtering)
Bias	High	Reduced (standard metrics)
Fresher Opportunity	Limited	High (skill-focused hiring)

13. FUTURE ENHANCEMENTS

- **AI-Based Recommendations:** Implement intelligent algorithms to suggest jobs and candidates based on skill patterns and performance.
- **Blockchain Certification:** Introduce tamper-proof certificates for secure and globally verifiable skill validation.
- **Advanced Anti-Cheat System:** Enhance assessment integrity using behavior tracking and real-time monitoring.
- **Multi-Domain Expansion:** Support a wider range of roles across different industries.
- **Automated Hiring Workflow:** Integrate interview scheduling, evaluation, and onboarding processes.

14. CONCLUSION

Devourtise is a modern skill-based hiring platform designed to overcome the limitations of traditional resume-driven recruitment systems. By focusing on verified skill assessments, certification, and intelligent job matching, the system ensures fair, transparent, and data-driven hiring decisions. It reduces dependency on resumes, minimizes bias, and improves the accuracy and efficiency of recruitment processes. The platform also provides equal opportunities for freshers and skilled individuals to prove their abilities through real performance.

Furthermore, its scalable architecture and integration of analytics enable organizations to make better hiring decisions with reduced time and cost. With future enhancements such as AI-based recommendations and secure certification systems, Devourtise has the potential to transform the recruitment ecosystem into a more reliable, efficient, and skill-focused model.

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