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One-Student-One Record

(An Integrated Framework for lifetime tracking using National Databases)

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Abstract: Governments worldwide struggle to effectively track students after they complete their education—whether they move into jobs, higher studies, or entrepreneurship. In India also, the absence of a unified tracking mechanism creates critical data gaps that hinder informed decision-making and policy formulation.

This paper proposes a scalable and practical model that integrates educational records with national databases such as **Aadhaar**, **GST**, **emigration data**, and **income tax filings**. By linking these datasets, the system provides a comprehensive view of each student's post-education trajectory/post educational Outcomes.

The model is built on a **Relational Database Management System (RDBMS)** to securely store, connect, and retrieve data from multiple sources. Structured queries enable seamless integration, generating dynamic profiles of career progression and real-world engagement.

This integrated approach offers immense value to **governments**, **educational institutions**, and **employers**, enabling insights into workforce trends, migration, skill utilization, and the impact of education policies.

The authors urge policymakers to adopt this model for evidence-based planning and accountability. Beyond being a technical solution, this is a **policy-enabling framework** that can transform how governments measure educational outcomes and plan for national development.

Keywords*: Student Data Tracking, Digital Record Integration, Aadhaar, GST, RDBMS, Post-Education Outcomes.*

1.Introduction

During their academic journey, student records are typically stored in isolated institutional databases that lack broad accessibility or interoperability. Once students complete their education, tracking their career paths becomes increasingly difficult. This disconnect makes it challenging to link educational accomplishments with real-world outcomes. After completing education, students have a wide range of career options available to them. The following are some of the major possibilities:

- **A. Employment (Job Market)**
  - Private Sector Jobs, government jobs, Contract/Freelance work etc.
- **B. Entrepreneurship & Business**
  - Starting a Business, Joining in Family Business, Self
- **C. Higher Education & Research**
  - Professional Courses, Postgraduate Studies, Research & Innovation, studying Abroad etc.
- **D. Creative & Artistic Fields**
  - Media & Entertainment, Design & Fine Arts, Writing & Publishing etc.
- **E. Social & Development Sector**
  - NGOs & Social Work, Politics & Public Service etc.
- **F. International Opportunities**
  - Emigration for Work, Overseas Education & Research, International Business etc.
- **G. Alternative Careers**
  - Sports & Fitness, spiritual & Religious Paths, Agricultural & Rural Development etc.

Tracking the post-education journey of students remains one of the most intricate and underdeveloped aspects of governance and educational policy. After completing their studies, students often diverge into various paths as mentioned above and this transition creates a significant data gap regarding their subsequent progress.

Information related to student outcomes is typically fragmented across disjointed systems such as university records, employment exchanges, tax databases, and migration logs. As a result, critical questions—such as whether a student has secured a job, pursued further studies, launched a startup, or moved abroad—often go unanswered. This lack of integrated data hinders our ability to understand how effectively educational institutions are preparing students for real-world challenges.

Consequently, policymakers are left without accurate insights into the returns from educational programs, scholarships, and skill development initiatives. This data void not only limits the potential for evidence-based educational reform but also impedes the government's ability to plan workforce requirements, address unemployment, to propose new educational policies and foster entrepreneurship.

In today's data-driven world, building a structured and ethically governed student tracking system is no longer optional—it is essential for inclusive and future-oriented national development. A unified approach can provide a complete picture of a learner's journey and offer meaningful insights to governments, universities, employers, and decision-makers.

This research proposes a unified data integration framework for Indian scenario under the concept of **"One Student – One Record."** The system aims to link educational records with national databases such as Aadhaar, GST, income tax filings, and emigration records, creating a comprehensive and continuously updated profile of each student's post-education status.

2. Present Student Data Storage Systems and their draw backs

Governments and universities manage vast volumes of data independently —ranging from academic records and research databases to healthcare information, financial transactions, census data, scientific simulations, and IoT-generated feeds. However, there are no big initiatives to link students data with students outcomes data either by educational institutes or by the government organisations.

In the **United States**, initiatives such as the *National Student Clearinghouse (NSC)* provide comprehensive data on student enrolment, graduation rates, and post-graduation outcomes. However, these systems are primarily focused on academic data and often lack integration with other critical sources, such as employment records, entrepreneurial ventures, or migration data.

In the **United Kingdom**, universities gather data on graduate employability through the *Destinations of Leavers from Higher Education (DLHE)* survey, which captures information on graduates six months after completing their studies. However, the self-reported nature of this data can limit its accuracy and reliability. It may not fully represent real-time outcomes or account for non-traditional career paths such as entrepreneurship or international employment.

In **India**, platforms like the *National Institutional Ranking Framework (NIRF)* and the *National Academic Depository (NAD)* have centralized access to academic records. Nevertheless, there remains a significant gap: these systems are not yet integrated with post-education outcome data, such as employment status, business creation, or international migration. A comprehensive, interconnected data infrastructure is still lacking.

Despite the promise of these technologies, there are numerous challenges in implementing a comprehensive student tracking system. Data Privacy and Security are among the top concerns.

Another significant challenge is interoperability between different government and educational databases. Each department or agency typically operates in isolation, with their own data standards, formats, and access protocols. Ensuring these systems can communicate effectively without data loss or corruption is a technical hurdle that requires the development of standardized data formats and robust API (Application Programming Interface) frameworks.

Moreover, ethical considerations must be addressed. Linking data across various domains (education, employment, tax, etc.) may create concerns about surveillance and control over individuals' post-education lives. Ensuring transparency in how this data is used and giving students control over their data is crucial to avoid unintended consequences, such as limiting career opportunities based on overly centralized information.

3. **Proposed Solution: One Student – One Record – Through Digital India**

Our research introduces the concept of **"One Student – One Record"**, a transformative system that enables the Indian government to seamlessly track a student's educational and career journey — even after they exit the formal education system. This ambitious vision is now feasible in India, thanks to the widespread adoption of **Aadhaar** (India's unique biometric identification system) and the growing integration of centralized digital platforms such as **GST**, **Income Tax**, and other national databases.

The proposed framework unifies student-related data under a **single, lifelong digital record**. It aims to interlink a student's educational history with key national databases — including **Aadhaar**, **GST**, **income tax filings**, and **emigration records** — to

create a dynamic, continuously updated profile. This profile will reflect not only academic credentials but also post-education trajectories like employment, entrepreneurship, skill development, and migration.

By ensuring that a student's academic journey and associated credentials remain **accessible, verifiable, and secure** throughout their lifetime, the system supports both individual empowerment and institutional accountability. Importantly, it also accommodates individuals who may discontinue formal education, ensuring they are not left behind in national development narratives.

Our integrated system fosters **transparency**, strengthens **governance**, and empowers **policymakers** with real-time data insights. These insights can drive evidence-based decisions in areas such as higher education planning, employment policies, skill development programs, and migration strategies.

Ultimately, the **"One Student – One Record"** initiative lays the foundation for a **knowledge-driven, self-reliant, and globally competitive India** — where every learner counts and every learning journey is valued.

Our integrated system leverages a **Relational Database Management System (RDBMS)** to ensure structured data storage, seamless interoperability, and efficient retrieval across multiple domains. By consolidating fragmented datasets into a unified and secure digital record, the framework provides stakeholders with reliable and up-to-date insights into students' career progressions.

In this study, we have demonstrated the integration of **students' educational records with Aadhaar and GST** data. Additional digital records, such as those related to income tax, emigration, and other government databases, can also be incorporated using similar methodologies.

4. RDBMS and SQL:

A **Relational Database Management System (RDBMS)** is a widely used data management platform that organizes information into structured tables with predefined relationships. It ensures **data integrity, consistency, and scalability**, making it suitable for handling large and complex datasets across various domains. In this study, the RDBMS enables the integration of educational records with other government datasets through **Aadhaar-based linking**, supporting efficient data operations and real-time queries.

To interact with the RDBMS, the project utilizes **Structured Query Language (SQL)**—a powerful language designed for **storing, retrieving, updating, and managing data** in relational databases. SQL supports complex joins, filtering, and aggregation, allowing the system to generate meaningful insights from multi-source data, such as verifying employment status or migration history post-education.

5. Aadhaar:

The Aadhaar program in India, launched in 2009, aims to provide every resident with a unique 12-digit identification number based on biometric and demographic data. It has become the world's largest biometric ID system, facilitating various services such as direct benefit transfers, financial transactions, and identity verification.

As of September 29, 2023, the Unique Identification Authority of India (UIDAI) has generated approximately **1.3808 billion (138.08 crore)** Aadhaar numbers for residents of India. Considering India's estimated population of around 1.4 billion, this indicates that over **98% of the population** has been assigned an Aadhaar number.

It's important to note that while Aadhaar coverage is extensive, it is not mandatory for all citizens. However, it is required (mandatory) for accessing certain government services and benefits like

- Filing **Income Tax Returns (ITR)**
- Applying for a **PAN card**
- Availing **subsidies or benefits under government schemes** funded from the Consolidated Fund of India (e.g., LPG subsidy, PDS rations, MGNREGA payments)

6. Goods And Service Tax:

Goods and Service tax (GST) is a unified indirect tax system in India introduced in the year 2017 to replace multiple state and central taxes in India. It simplifies the tax structure and promotes ease of doing business through a digital platform. GST is supported by the GSTN (Goods and Services Tax Network), which facilitates online registration, filing, and compliance, contributing significantly to India's digital governance ecosystem. In India, **GST registration is compulsory** for certain individuals and businesses under the **Goods and Services Tax Act**.

As of **2024**, India has approximately **14 million** registered Goods and Services Tax (GST) taxpayers. This reflects a significant increase since the GST's inception in 2017, when there were about 6.4 million registrations.

Similarly, As of **February 2025**, approximately over **9.11 crore** Income Tax Returns (ITRs) have been filed for the financial year 2024-25, reflecting a 6.8% increase compared to the previous fiscal year.

6. Core Idea

In this paper, Aadhaar plays a foundational role by acting as the single, universal identifier that connects a student's academic journey to their post-education life outcomes. At the time of college admission or at the time of first semester examination registration, the student's Aadhaar number is collected and verified to ensure authenticity, prevent duplicate entries, and establish a consistent digital identity across institutions. This Aadhaar-linked student record is then maintained throughout the course duration and submitted by affiliated colleges to their respective affiliating universities, which later pass it on to central government databases.

After graduation, the same Aadhaar ID is used to link the student's record with other national systems/databases, such as the GST portal, EPFO payroll databases, and income tax records etc. This enables the government to automatically detect whether the student is employed in a company, self-employed, working abroad, or currently unemployed, based on verified economic activity tied to their Aadhaar. The business organisations should submit any change in employee data (newly recruited, anybody resigned etc.) along with monthly GST return.

By using Aadhaar as the connecting bridge between academic and employment ecosystems, the system eliminates manual tracking, ensures zero fraud, and provides accurate, real-time insights into graduate outcomes at a national scale. It transforms Aadhaar from just an identity number into a lifelong academic and career tracker, powering better policy decisions, rankings, and resource allocation by the government.

7. Technology Used

In this paper, RDBMS is used as the backbone for organizing, storing, and managing large volumes of structured student and employment data. Two core relational tables are proposed: one for students—containing details like Aadhaar number, academic records, institution info, and exam history—and another for employment, capturing data such as GST records, employer details, income tax activity, and self-employment status. The Aadhaar number acts as the **primary key** in both tables, enabling **relational joins** to establish a direct link between a student's academic profile and their post-education career status.

RDBMS features like indexing, normalization, constraints, and query optimization help ensure data consistency, reduce redundancy, and enable fast retrieval of individual or aggregate information. This structure also allows for seamless updates as new data (e.g., annual GST filings or tax returns) arrives, supporting real-time tracking and analytics. Ultimately, RDBMS provides the scalable, secure, and efficient infrastructure needed to implement a transparent and accountable nationwide student-employment tracking system.

8. Basic SQL SCHEMA (for student record and employee record)

```
-- University Table
CREATE TABLE University (
    UniversityID INT PRIMARY KEY,
    UniversityName VARCHAR(100),
    Region VARCHAR(50)
);

-- College Table
CREATE TABLE College (
    CollegeID INT PRIMARY KEY,
    CollegeName VARCHAR(100),
    UniversityID INT,
    Location VARCHAR(100),
    Type VARCHAR(20),
    FOREIGN KEY (UniversityID) REFERENCES University(UniversityID)
);

-- Student Table
CREATE TABLE Student (
    AadhaarNumber CHAR(12) UNIQUE NOT NULL,
    Name VARCHAR(100),
    Enrolment status CHAR(20),
    DegreeVARCHAR(50) )

    );

-- Employment Table
CREATE TABLE Employment (
    AadhaarNumber CHAR(12),
    EmplouerName VARCHAR(100),
    GSTIN VARCHAR(15),
    EmploymentType VARCHAR(20),
    AnnualIncome DECIMAL(10,2),
```

```
    LastUpdatedDate DATE,
    FOREIGN KEY (AadhaarNumber) REFERENCES Student(AadhaarNumber)
);

-- GST Record Table
CREATE TABLE GST_Record (
    GSTIN VARCHAR(15) PRIMARY KEY,
    CompanyName VARCHAR(100),
    AadhaarNumber CHAR(12),
    GST Registereed CHAR (5),
    TAXRETURNSTATUS char(10).  )
```

Sample Database Snapshot

Table 1 Students Table

Aadhaar Number	Name	Enrolment Status	Degree	Exam Registration Date
123456789012	Rajesh Kumar	Active	B.Tech (IT)	2023-05-10
987654321098	Priya Sharma	Graduated	B.Sc (Physics)	2021-06-15
456123789456	Amit Verma	Dropped Out	B.Com	2019-08-20

Table 2 **Employment Table**

Aadhaar Number	Employer	GST Registered	Tax Return Status
987654321098	Infosys Ltd.	Yes	Filed
456123789456	None	No	Not Filed

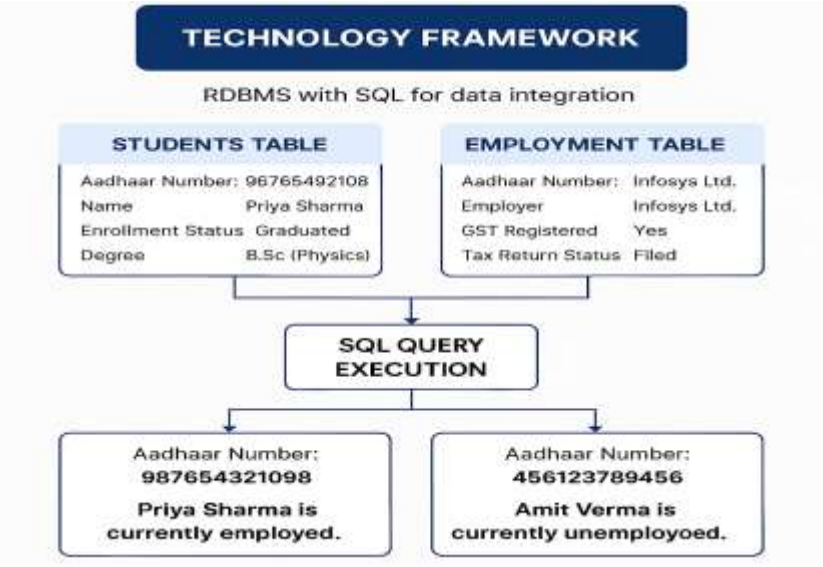
6.2 Query Execution Demonstration

Case 1 – Aadhaar: 987654321098

- Priya Sharma is found in the Students Table as a **graduate** in 2021.
- In the Employment Table, she is listed as employed at **Infosys Ltd.**, with **GST registered** and **tax return filed**.
- **Result**: *"Priya Sharma is currently employed."*

Case 2 – Aadhaar: 456123789456

- Amit Verma is recorded as a **dropout** in the Students Table.
- No employer details are available; **GST not registered** and **tax return not filed**.
- **Result**: *"Amit Verma is currently unemployed."*



"The beauty of the Relational Database Management System (RDBMS) architecture lies in its inherent flexibility — it gracefully accommodates the addition of new columns to any existing table. Thus, supplementary fields can be seamlessly integrated into the aforementioned tables as and when the need arises. Furthermore, one can effortlessly design and incorporate additional tables to capture diverse records such as emigration details, marriage registrations, higher education pursuits, and beyond, thereby enriching the database ecosystem with structured and scalable data repositories."

8. RESULT AND ANALYSIS

The implementation of the proposed **Aadhaar-linked student-employment tracking system** provides institutions and government agencies with a robust, real-time dashboard to monitor graduate outcomes nationwide. The findings indicate that utilizing Aadhaar as a universal identifier substantially enhances data accuracy, eliminates duplicate and fraudulent student records, and facilitates seamless integration between educational and employment databases.

By executing structured relational database queries, institutions can efficiently extract key statistics such as:

- The percentage of graduates employed within six months of completing their studies,
- The number of self-employed alumni categorized by region,
- Trends in unemployment segmented by academic discipline and university.

Furthermore, the integration of **GST records** linked to Aadhaar unveils crucial insights into the **self-employment landscape**. This includes the emergence of student-founded startups, the growth of freelance professionals, and the rise of GST-registered micro-entrepreneurs. Such data allows higher education institutions to critically assess the practical impact and effectiveness of their academic programs.

In addition, national ranking frameworks such as **NIRF** can transition from relying on surveys or self-reported metrics to basing their rankings on verified post-graduation outcomes. This improves credibility and ensures that rankings reflect ground realities.

Policy makers can also leverage this system to identify geographic or institutional clusters with consistently low employment rates. This information is instrumental in designing **targeted skill development initiatives**, revising academic curricula, or allocating **funding for employability enhancement programs**.

Overall, the proposed model fosters **transparency, accountability**, and the development of a **unified national data ecosystem**. Every student record becomes a dynamic and traceable entity, capturing not only educational milestones but also employment trajectories, economic participation, and upward social mobility. This transformation marks a significant shift from static academic records to a **future-ready, employment-integrated education framework**.

9. Future Scope

The research model proposed in this study offers a high degree of flexibility, enabling both government bodies and educational institutions to implement it using any type of database system or query language that best fits their operational needs and preferences. This adaptability ensures that organizations are not constrained by specific technologies. Moreover, institutions can choose from a variety of mechanisms to uphold data integrity and enforce robust security measures, based on their unique requirements. One of the key strengths of this approach is its scalability—government departments can integrate multiple independent databases across various sectors seamlessly, without facing significant technical challenges. This modular design ensures long-term sustainability and ease of expansion.

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