While SQL and Python can be powerful tools, they alone cannot solve the entire problem statement. However, they can play a significant role in analyzing data and building solutions for points 1 and 2. Point 3, expense management, requires a separate system. Here's a breakdown with potential solutions using SQL and Python:

**1. Identifying the Right Hire (Leveraging External Data):**

* **Data Collection:**
  + Use APIs or web scraping to gather public data on potential candidates (e.g., LinkedIn profiles, GitHub activity).
  + Internally, store data on past successful and unsuccessful hires (skills, experience, education).
* **Data Processing (Python):**
  + Use libraries like pandas to clean and pre-process the data (standardize formats, remove inconsistencies).
  + Develop algorithms (e.g., machine learning) to analyze the combined data and identify patterns in successful hires.
  + Build a scoring system based on these patterns.
* **Data Analysis (SQL & Python):**
  + Use SQL queries to retrieve relevant data from internal databases (skills, experience) on past hires.
  + Combine this data with the processed external data in Python for analysis.
  + Identify trends and correlations between candidate attributes and success in your organization.

**2. Predicting Employee Resignation (Lowering Attrition):**

* **Data Collection:**
  + Use SQL queries to extract employee data (performance reviews, work hours, project involvement, demographics).
  + Consider collecting additional data through surveys on employee satisfaction and sentiment analysis of internal communication.
* **Data Processing & Analysis (Python):**
  + Use Python libraries like sci-kit-learn to build models that predict resignation risk.
  + Train models on historical data using features like performance metrics, work hours, and survey responses.
  + Analyze model outputs (probability of resignation) to identify at-risk employees.
* **Actionable Insights:**
  + Use Python to visualize the results and identify red flags associated with high resignation risk.
  + Implement HR interventions for identified at-risk employees (e.g., training opportunities, mentorship programs).

**3. Expense Management System (Separate System):**

This point requires a dedicated system to handle employee expense submissions, approvals, and reimbursements. While Python can be used to build a web application for expense management, it's often easier to leverage pre-built solutions or cloud services.

**Important Note:**

* Implementing these solutions requires expertise in SQL, Python, data analysis, and potentially machine learning.
* Data privacy and security are crucial considerations when handling employee data.

**Additional Considerations:**

* This is a high-level overview. Specific implementation details will depend on your data sources, tools, and organizational needs.
* Consider ethical implications of using external data and potential biases in machine learning models.

By combining SQL for data retrieval and Python for analysis and modeling, you can gain valuable insights to make better hiring decisions and reduce employee turnover. However, a complete expense management solution requires a dedicated system.

Data Formats

Here's a breakdown of the specific data you might look for to address each part of the problem statement:

**1. Identifying the Right Hire (External Data):**

* **Candidate Data:**
  + **Public profiles:**
    - Skills and experience listed on platforms like LinkedIn or resumes.
    - Educational background and achievements.
    - Projects undertaken and contributions on platforms like GitHub.
    - Certifications and awards.
  + **Online presence:**
    - Activity and engagement on relevant online communities or forums (if publicly available).
    - Publicly available content creation (e.g., blog posts) showcasing expertise.
* **Internal Data:**
  + **Past successful hires:**
    - Skills listed in job descriptions they were hired for.
    - Educational backgrounds and experiences.
    - Performance data during their tenure.
  + **Past unsuccessful hires:**
    - Skills and experiences listed on their applications.
    - Reasons for not succeeding in the role (if available through exit interviews or performance reviews).

**2. Predicting Employee Resignation (Lowering Attrition):**

* **Employee Data:**
  + **Performance metrics:**
    - Performance review scores.
    - Project completion rates and quality.
    - Meeting deadlines and attendance records.
  + **Work engagement:**
    - Hours worked (including overtime).
    - Meeting participation and contribution.
    - Project involvement and leadership roles.
  + **Demographics:**
    - Age, tenure, department, and position. (Ensure this data is anonymized and used ethically)
* **Additional Data (Optional):**
  + **Employee surveys:**
    - Questions about job satisfaction, work-life balance, and company culture.
  + **Internal communication sentiment analysis:**
    - Analyze company emails, chat logs, or internal forums to gauge overall employee sentiment. (Ensure this is done with privacy considerations)

**3. Expense Management System (Separate System):**

This point requires data related to employee expenses, such as:

* Receipts for travel, meals, or other work-related purchases.
* Expense categories (e.g., travel, office supplies).
* Amount spent.
* Project or department the expense is associated with.

**Remember:**

* Data privacy regulations and ethical considerations are paramount when collecting and handling employee data.
* Focus on anonymized data for aspects like demographics and sentiment analysis.