**Build a Simple Lead Generation System with Email Notifications and n8n Workflow Automation**

This document provides instructions on setting up and running the lead generation system, explains the integration of n8n workflows with the backend, and outlines how the system can be extended for future enhancements.

**1. How to Set Up and Run the Lead Generation System**

To get the lead generation system operational, follow these high-level steps:

**Setup:**

1. **Backend Application:**
   * **Clone the repository:** Obtain the source code from the version control system.
   * **Install dependencies:** Use pip install -r requirements.txt (assuming Python) to install all necessary libraries.
   * **Configure environment variables:** Create a .env file with critical settings like database connection strings, API keys, and n8n webhook URLs. Refer to an env.example file if provided.
   * **Database Setup:** Ensure your database (e.g., PostgreSQL) is running and accessible. Apply any necessary migrations to set up the database schema.
2. **n8n Workflows:**
   * **Install/Access n8n:** Set up your n8n instance (self-hosted or cloud).
   * **Import Workflows:** Import the provided n8n workflow JSON files into your n8n instance. These workflows orchestrate lead collection and processing.
   * **Configure Credentials:** Within n8n, set up all required credentials for third-party services (e.g., email providers, data enrichment APIs) and database access.
   * **Activate Workflows:** Ensure all imported n8n workflows are toggled "On" to be active.

**Running:**

1. **Start Backend:** Execute the command to start your backend application server (e.g., python manage.py runserver).
2. **Ensure n8n is Running:** Verify that your n8n instance is running and accessible.

Once both the backend and n8n workflows are active, the system will begin processing leads according to its configured logic.

**2. How n8n Workflows are Integrated with the Backend**

n8n workflows act as the orchestration layer, interacting with the backend application through its API:

* **Data Ingestion:** n8n workflows are typically triggered by external events (e.g., webhooks from lead forms, scheduled scrapes). They capture raw lead data and then **send this data to specific API endpoints on the backend** (e.g., a POST /api/leads/raw endpoint).
* **Data Enrichment & Qualification:** After the backend receives a raw lead, it might trigger another n8n workflow (via a webhook) when a new lead is available for qualification. This n8n workflow then performs actions like:
  + Calling third-party data enrichment APIs (e.g., Clearbit, Hunter.io).
  + Applying internal logic to qualify the lead.
  + **Updating the lead's status and enriched data in the backend** by calling relevant API endpoints (e.g., PUT /api/leads/{lead\_id}/qualify).
* **CRM/Communication Integration:** Once a lead is qualified, the backend can again trigger an n8n workflow. This workflow is responsible for:
  + Pushing the qualified lead to a CRM system (e.g., HubSpot, Salesforce) using n8n's CRM integrations.
  + Sending automated emails or notifications.
  + **Updating the backend with the CRM ID or communication status** via an API call.

In essence, n8n handles the external integrations and complex multi-step processes, while the backend serves as the central data store, business logic engine, and provides the API endpoints for n8n to interact with.

**3. How the System Can Be Extended in the Future**

The modular design allows for significant future extensibility:

* **Adding More Lead Qualification:**
  + **Backend:** Add new fields to your lead data model to store additional qualification criteria. Implement new backend logic for complex scoring or rule-sets.
  + **n8n:** Integrate new data enrichment APIs within the lead\_qualification n8n workflow. Add more decision nodes to apply advanced qualification rules based on new data points.
* **Integrating with CRM (or other external services):**
  + **Backend:** Add fields to store CRM-specific IDs or status. Potentially add new webhook triggers for CRM-related events.
  + **n8n:** Create new n8n workflows or extend existing ones to connect to new CRM platforms (e.g., Salesforce, Zoho CRM) using n8n's dedicated nodes. Configure data mapping between your lead data and CRM fields.
* **Adding New Lead Sources:**
  + **Backend:** The backend's API for ingesting raw leads is designed to be generic.
  + **n8n:** Simply create a *new* n8n workflow for each new lead source (e.g., LinkedIn form, specific event registration system). Use the appropriate n8n trigger for that source and transform the data to fit the backend's raw lead ingestion API.