# Project Planning Phase-3
## Technology Stack (Third Party API's)

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| Project Name | Machine learning model for occupancy rates and demand in hospitality industries |
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Third party API's

When building a machine learning model for predicting occupancy rates and demand in the hospitality industry, integrating third-party APIs can enhance the quality and accuracy of your predictions. Here are some third-party APIs you can consider incorporating into your system:

**1. Weather Data API:**

   - Services like OpenWeatherMap or Dark Sky (now part of Apple) provide historical and real-time weather data, which can be essential for predicting demand in the hospitality industry. Weather conditions can significantly impact travel plans and hotel bookings.

**2. Event Data API:**

   - APIs like Eventful or Meetup can provide information about local events, conferences, concerts, and festivals. Integrating event data can help your model anticipate spikes in demand related to specific events in the area.

**3. Travel and Flight Information APIs:**

   - APIs such as Amadeus or Skyscanner offer travel and flight data. You can use these APIs to monitor flight schedules, airport information, and airline ticket prices, all of which can influence hotel occupancy rates.

**4. Traffic and Transportation APIs:**

   - Google Maps or HERE Location Services provide traffic and transportation data. This information can be used to estimate travel times and congestion, which affects the arrival of guests.

**5. Social Media APIs:**

   - Social media platforms like Twitter, Instagram, and Facebook offer APIs to collect and analyze social media data. This can help in tracking trends, events, and public sentiment related to travel and hospitality.

**6. Economic Indicators APIs:**

   - APIs like Quandl or FRED (Federal Reserve Economic Data) provide access to various economic indicators such as GDP, employment rates, and consumer confidence. These indicators can be incorporated into your model to account for broader economic conditions affecting the hospitality industry.

**7. Online Booking and Review APIs:**

   - APIs from platforms like Booking.com, TripAdvisor, or Airbnb can provide insights into competitor occupancy rates, pricing strategies, and guest reviews. This information can be valuable for market analysis and competitive pricing.

**8. Language Translation APIs:**

   - If you're dealing with a diverse international clientele, translation APIs like Google Cloud Translation or IBM Watson Language Translator can help bridge language barriers and improve customer service.

**9. Payment Gateway APIs:**

   - Integrating payment gateways like Stripe, PayPal, or Square can facilitate online reservations and transactions, allowing you to track demand based on payment activity.

**10. Sentiment Analysis APIs:**

  - Text analysis APIs like IBM Watson Natural Language Understanding or Microsoft Azure Text Analytics can help gauge customer sentiment and assess online reviews, providing additional insights into demand factors.

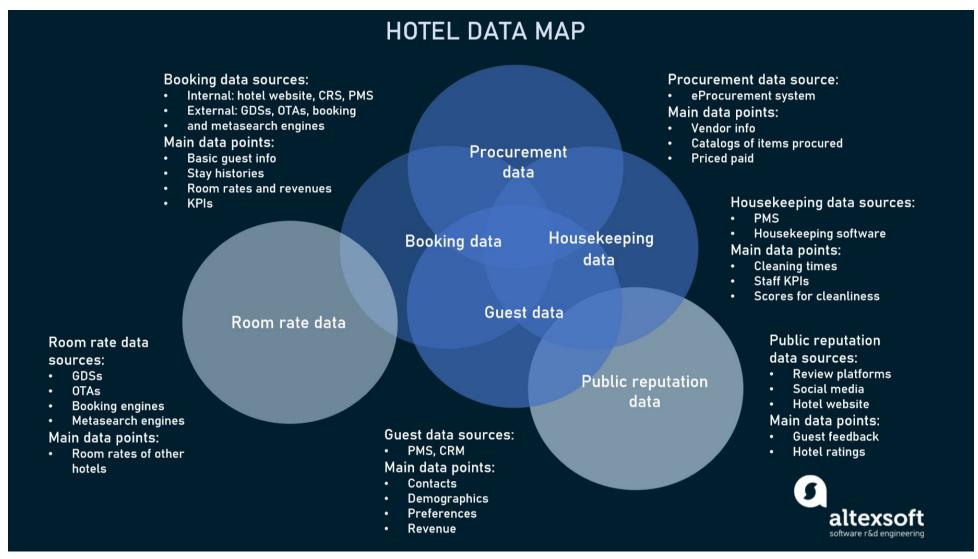**11. Local Attractions and Points of Interest APIs:**

  - APIs like Google Places or Foursquare can provide information about local attractions, restaurants, and points of interest, influencing guest decisions.

**12. COVID-19 Data APIs (if applicable):**

  - During times of public health crises, COVID-19 data APIs, such as those provided by Johns Hopkins University or government health agencies, can be used to track infection rates and restrictions that affect occupancy.

**13. Marketing and Advertising APIs:**

  - APIs from platforms like Google Ads, Facebook Ads, or LinkedIn Ads can help in monitoring and adjusting marketing campaigns based on demand predictions.

# HOTEL DATA MAP

**Booking data sources:**
- Internal: hotel website, CRS, PMS
- External: GDSs, OTAs, booking and metasearch engines

**Main data points:**
- Basic guest info
- Stay histories
- Room rates and revenues
- KPIs

**Procurement data source:**
- eProcurement system

**Main data points:**
- Vendor info
- Catalogs of items procured
- Priced paid

**Procurement data**

**Booking data**

**Housekeeping data**

**Housekeeping data sources:**
- PMS
- Housekeeping software

**Main data points:**
- Cleaning times
- Staff KPIs
- Scores for cleanliness

**Room rate data**

**Guest data**

**Room rate data sources:**
- GDSs
- OTAs
- Booking engines
- Metasearch engines

**Main data points:**
- Room rates of other hotels

**Public reputation data**

**Public reputation data sources:**
- Review platforms
- Social media
- Hotel website

**Main data points:**
- Guest feedback
- Hotel ratings

**Guest data sources:**
- PMS, CRM

**Main data points:**
- Contacts
- Demographics
- Preferences
- Revenue

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Integrating these third-party APIs into your machine learning model can provide a rich source of external data, making your occupancy rate and demand predictions more accurate and adaptable to real-world conditions. However, it's important to manage API usage, data privacy, and ensure that you have the necessary permissions to access and utilize external data sources.

There are a number of third-party APIs that can be used to build machine learning models for occupancy rates and demand in the hospitality industry. Some of the most popular options include:

**Google Cloud Platform (GCP) Prediction API:** The GCP Prediction API is a machine learning service that can be used to build and deploy predictive models. The Prediction API supports a variety of machine learning algorithms, including linear regression, logistic regression, and decision trees.

**Amazon Web Services (AWS) SageMaker:** AWS SageMaker is a machine learning platform that makes it easy to build, train, and deploy machine learning models. SageMaker supports a variety of machine learning frameworks, including TensorFlow, PyTorch, and scikit-learn.

**Microsoft Azure Machine Learning Studio:** Azure Machine Learning Studio is a drag-and-drop machine learning environment that makes it easy to build and deploy machine learning models without having to write any code. Azure Machine Learning Studio supports a variety of machine learning algorithms, including linear regression, logistic regression, and decision trees.

**Benefits of using third-party APIs**

There are a number of benefits to using third-party APIs to build machine learning models for occupancy rates and demand in

the hospitality industry. Some of the key benefits include:

**Ease of use**: Third-party APIs are typically designed to be easy to use, even for users with limited machine learning experience.

**Scalability**: Third-party APIs are typically scalable, meaning that they can be used to train and deploy models on large datasets.

**Reliability**: Third-party APIs are typically reliable and well-tested.

**Examples of third-party APIs**

Here are some examples of third-party APIs that can be used to build machine learning models for occupancy rates and demand in the hospitality industry:

**Airbnb demand forecasting API:** This API provides predictions of Airbnb demand for a given location and date range. The API uses a variety of factors, including historical booking data, seasonality, and events, to generate its predictions.

**Booking.com demand forecasting API:** This API provides predictions of Booking.com demand for a given property and date range. The API uses a variety of factors, including historical booking data, seasonality, and events, to generate its predictions.

**HotelIQ demand forecasting API**: This API provides predictions of hotel demand for a given market and date range. The API uses a variety of factors, including historical booking data, seasonality, and events, to generate its predictions.

Software used : Alexsoft

Using of Third party API's :

* Extract the relevant features from the API's data.

* Preprocess the data to ensure that it is in a format that can be used by your machine learning algorithm.

* Split the data into training and test sets.

* Train your machine learning model on the training data.

* Evaluate the performance of your model on the test data.

**Conclusion**

Third-party APIs can be a great way to build machine learning models for occupancy rates and demand in the hospitality

industry. By following the steps outlined above, you can use third-party APIs to build accurate and reliable models that can help you to improve your hotel's performance.

Here are some additional tips for using third-party APIs to build machine learning models for occupancy rates and demand in the hospitality industry:

Use multiple APIs: If possible, use multiple APIs to obtain data for your model. This will help to ensure that your model is not biased towards any one API.

Use a variety of features: Use a variety of features in your model, including historical booking data, seasonality, events, and competitor data. This will help your model to make more accurate predictions.

Monitor your model's performance: Once you have deployed your model, monitor its performance to ensure that it is still accurately predicting occupancy rates and demand.