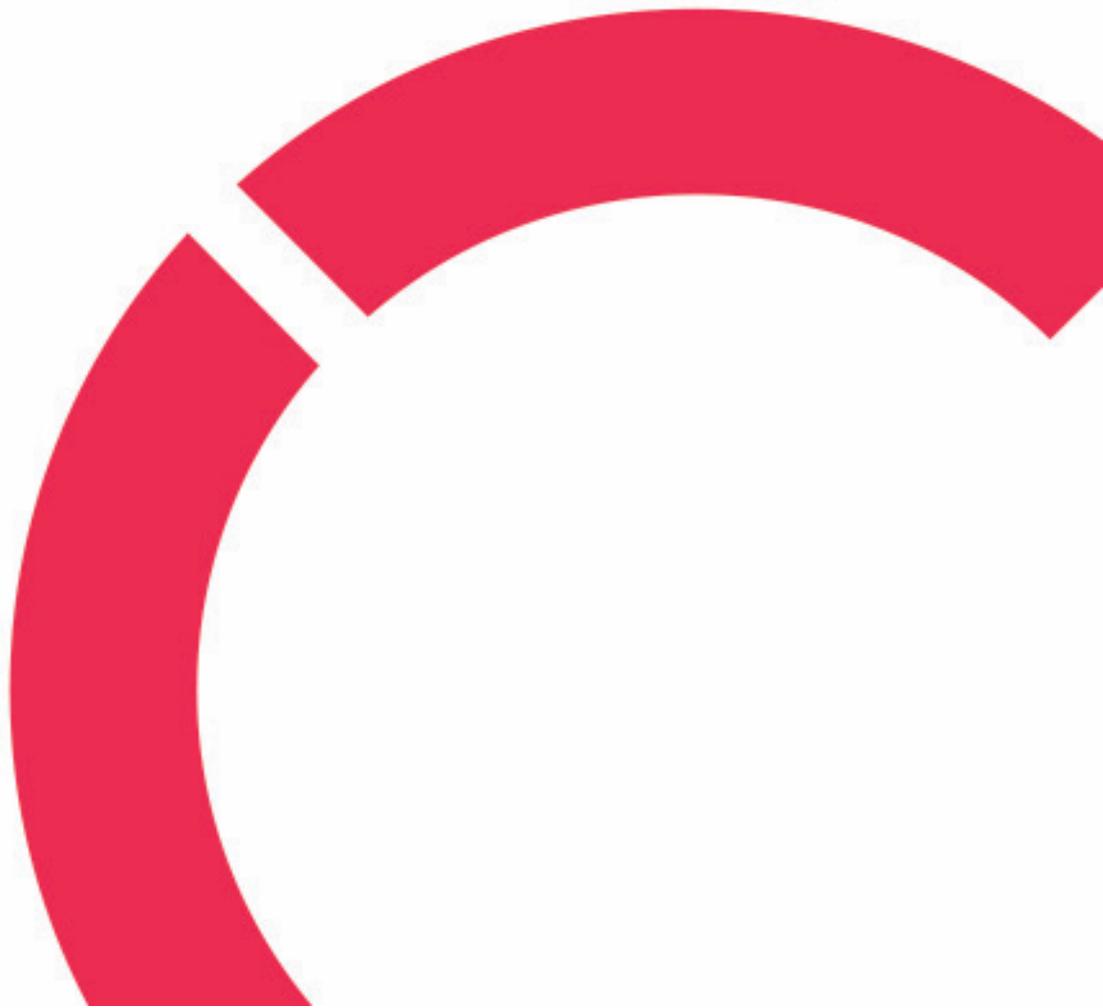


Huong Nguyen NITS19K

**LEARN AND USE API
Facebook API**

**Thesis
CENTRIA UNIVERSITY OF APPLIED SCIENCES
Information Technology
Septemper 2022**



ABSTRACT

Centria University of Applied Sciences	Date September 2022	Author Huong Nguyen NITS19K
Degree programme Information Technology		
Name of thesis LEARN AND USE API. Facebook API		
Centria supervisor Jari Isohanni		Pages 51
<p>Facebook API is a platform that allows programmers to easily connect applications to Facebook. Programmers (app creators) can use the API to obtain information about Facebook users, groups, photos. In addition to Facebook, large corporations such as Google, Yahoo, and Amazon provide API platforms to programmers for the purpose of connecting applications. Facebook API not only connects Facebook applications with users, but it also allows website content to automatically post to social networks in a quick and convenient manner.</p> <p>This project will clarify concepts related to Facebook API such as API, Graph API and Facebook Graph API, as well as learn tools related to APIs, Platforms, Products, and SDKs to meet the needs of applications. For a more in-depth look at how to use these tools, please see the official documentation provided by Meta - Facebook's parent company - at this link: https://developers.facebook.com/docs/</p>		

<p>Key words Facebook API, API, GRAPH API, REST API, Facebook Graph API</p>

CONCEPT DEFINITIONS

API

Application Programming Interface.

REST

Representational state transfer

HTTP

The Hypertext Transfer Protocol

HTTPS

The Hypertext Transfer Protocol Secure

SDK

Software development kit

URL

Uniform Resource Locator

JSON

JavaScript Object Notation

XML

Extensible Markup Language

cURL

Client URL

Urllib

Urllib package is the URL handling module for python

CRM

Customer relationship management

ABSTRACT
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1 INTRODUCTION

The term API seems to have first appeared in Ira W. Cotton's article, Data Structures and Techniques for Remote Desktop Graphics, published in 1968. In building applications, APIs simplify programming by abstracting away the underlying implementation and exposing only the objects or actions the developer needs. While a graphical interface for an email client can provide the user with a button to go through all the steps to fetch and highlight new email, the API for file input/output can provide developers with ability to copy files from one location to another without requiring the developer to understand the file system operations that happen behind the scenes.

The topic was written for the purpose of learning about APIs, social network APIs and it focuses on Facebook social network API. The objectives set for the implementation of the thesis are: Overview of API, API of social networks, GRAPH API, learn about Facebook API, and great applications when working with Facebook API.

2 API

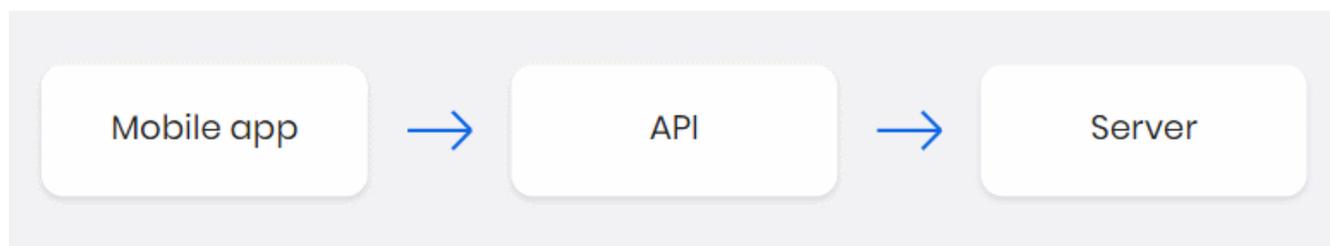
API is an abbreviation for Application Programming Interface. In the context of APIs, the term application refers to any software that performs a specific function. Interface can be viewed as a service contract between two applications. This contract specifies how the two will communicate with one another via requests and responses. API documentation explains how developers should structure those requests and responses. (aws 2022.)

2.1 API definition

APIs are mechanisms that allow two software components to communicate with one another through the use of a set of definitions and protocols. The weather bureau's software system, for example, contains daily weather data. Phone's weather app "talks" to this system via APIs and displays daily weather updates. (Park 2022.)

2.1.1 Concept

API is an abbreviation for application programming interface. An API is essentially a set of rules that govern how two machines communicate with one another. A cloud application communicating with a server, servers pinging each other, or applications interacting with an operating system are all examples of API-based interactions. When using an app on phone or computer, or log into Twitter or Facebook, there is interacting with a variety of APIs. APIs are used at some level by nearly all businesses that use modern technology to retrieve data or interact with a database for customers to use. (Park 2022.)



PICTURE 1: API concept.

APIs are now REST and HTTP compliant, it is making easy to use for developers, making it more accessible and understandable for users. Modern Web APIs are designed with different documents and versions for specific audiences, such as mobile developers. An API's primary goal is to provide access to a set of commonly used functions, such as those used to draw windows or desktop icons. APIs are abstract, as are the vast majority of interfaces. Software that wants to access itself through available APIs must be able to implement those APIs. In many cases, an API is included as part of an SDK, or software development kit. The terms SDK and API are not interchangeable because an SDK can include both an API and tools/hardware.(TOPDev 2022.)

API key is a type of code (string) sent by computer programs called APIs to the website to identify the program, its developer, or its user. API keys are used for restricting and controlling API usage. For example, preventing API abuse is an example of API keys uses. An API Key typically serves as a unique identifier and secret token for authentication, and it is associated with a set of API permissions. To ensure that API Keys are unique for each user, they can be based on a globally unique identifier (UUID) system. (TOPDev 2022.)

For a better explanation, refer to the example below: Assume when a table in a restaurant with a menu of options to choose from. The kitchen is the "system" component that will prepare the order. What is missing is the critical link that allows to communicate the order to the kitchen and have the food delivered to table. This is where the waiter or API comes into play. The waiter is the messenger – or API – who takes the request or order and relays it to the kitchen – the system. The waiter then returns the response; in this case, the food. (MuleSoft 2022.)

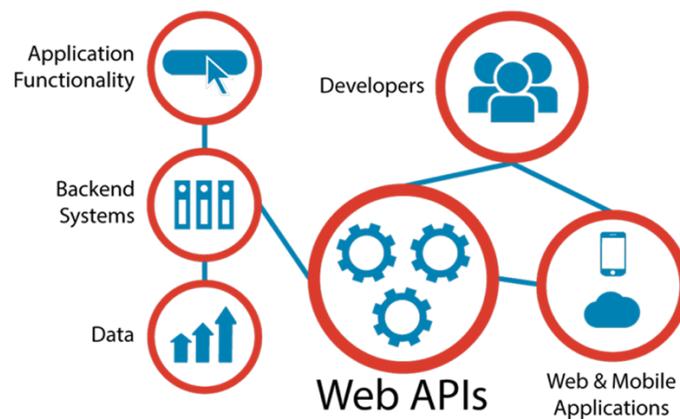
2.1.2 API application

A more pertinent question might be things that APIs not used for. Wanting to include Instagram photos in the e-commerce app, there is an API for it. Wanting to give the travel blog readers instant access to thousands of hotels, there is an API for it. Wanting to include a Yoda translator on Star Wars fan fiction website, it has an API.

About data sharing, data can be shared through an API whenever a program needs to get data from a third party (for example, a travel app compiling flight times from airlines or an e-commerce site getting payment information from a payment processor). App integrations, when two digital applications work in conjunction, Facebook and Gmail, for example, it's likely that an API is involved. Embedded

content, to embed content that is not hosted by the same company as the website – such as a YouTube video or a third-party script like Google Analytics – a request is made to the owner of the embedded content to retrieve it. Internal systems, APIs aren't just for sharing data with others. Companies frequently divide their software infrastructure into smaller components that communicate with one another via APIs, as in a microservice architecture. (HubSpot 2022.)

Web API is the API system that is used in website systems. Most websites have Web API applications that allow to connect to retrieve data from, or update databases. For example, supposing to create login functionality for Google, Facebook, Twitter, and GitHub are retrieve data from databases. This means making API calls. Alternatively, all mobile apps receive data via API. (TOPDev 2022.)



PICTURE 2: Web APIs (APIacademy 2015.)

About APIs on the operating system, Windows and Linux have a large number of APIs; they provide API documents that specify functions, methods, and connection protocols. It enables programmers to create application software that can interact with the operating system directly. (TOPDev 2022.)

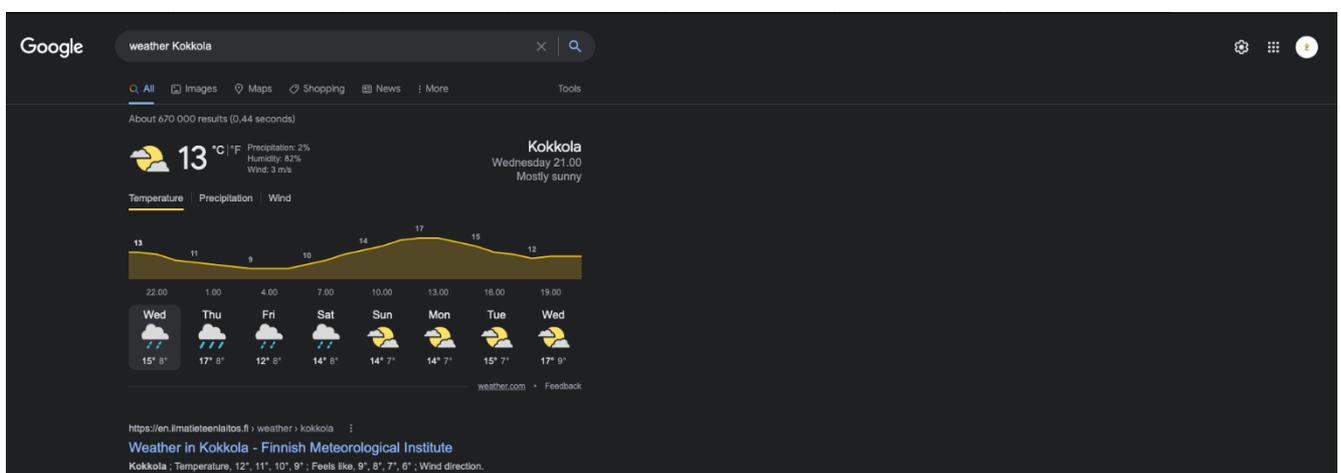
An API of a software library or framework is a description and specification of the desired actions that libraries provide. An API can have numerous implementations, and it also allows a program written in one language to use a library written in another. For example, using PHP to request that a library generate PDF files written in C++. (TOPDev 2022.)

2.2 API working mechanism

The first step is to create an API URL through which a third party can request data from a server that provides content and services via the HTTP or HTTPS protocol. The source applications will perform validation checks, if any, and find the appropriate resource to generate the content and return the results at the web server that provides the content. Using the HTTP/HTTPS protocol, the server returns results in JSON or XML format. When a web or mobile app makes the initial request, the JSON/XML data is parsed to obtain the data. After obtaining the data, carry out additional operations such as saving it to the database and displaying it. (Davis 2019.)

APIs communicate using a set of rules that define how computers, applications, or machines can communicate with one another. The API acts as a go-between for any two machines that need to communicate with each other for a specific task. Web APIs is the most common type of API, but they are only available on the web. APIs are available for almost any machine or system that expects to interact with other machines or systems. APIs have been around for a long time, but they have only recently gained popularity. Companies use this technology to gain a competitive advantage by finding more efficient ways to retrieve information faster in order to better serve their customers. (Davis 2019.)

Weather data is a common API usage example that can be seen daily. Rich weather snippets appear to be commonplace, appearing on all platforms, such as Google Search, Apple's Weather app, and even smart home devices. For example, if searching "weather + [city's name]" on Google, there is a dedicated box at the top of the search results (called a rich snippet) with the current weather conditions and forecast. As an example, consider the search term "weather Kokkola."

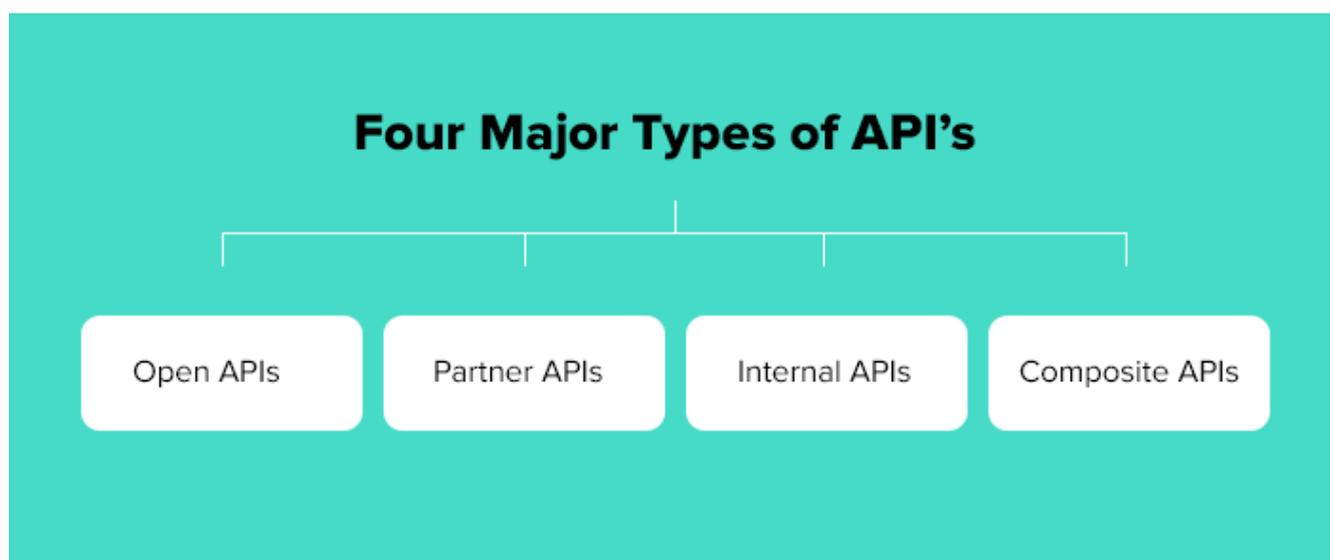


PICTURE 3: Weather data (Kokkola's weather)

APIs are everywhere, and all it takes is picking up a smartphone to see them in action. APIs power everything from Google weather searches, Facebook logins, MobilePay payments, and Twitter bot interactions. Furthermore, there is a lot more going on with APIs behind the scenes. They are less visible, but they are essential in daily digital lives. (Bush 2019.)

2.3 Different types of APIs

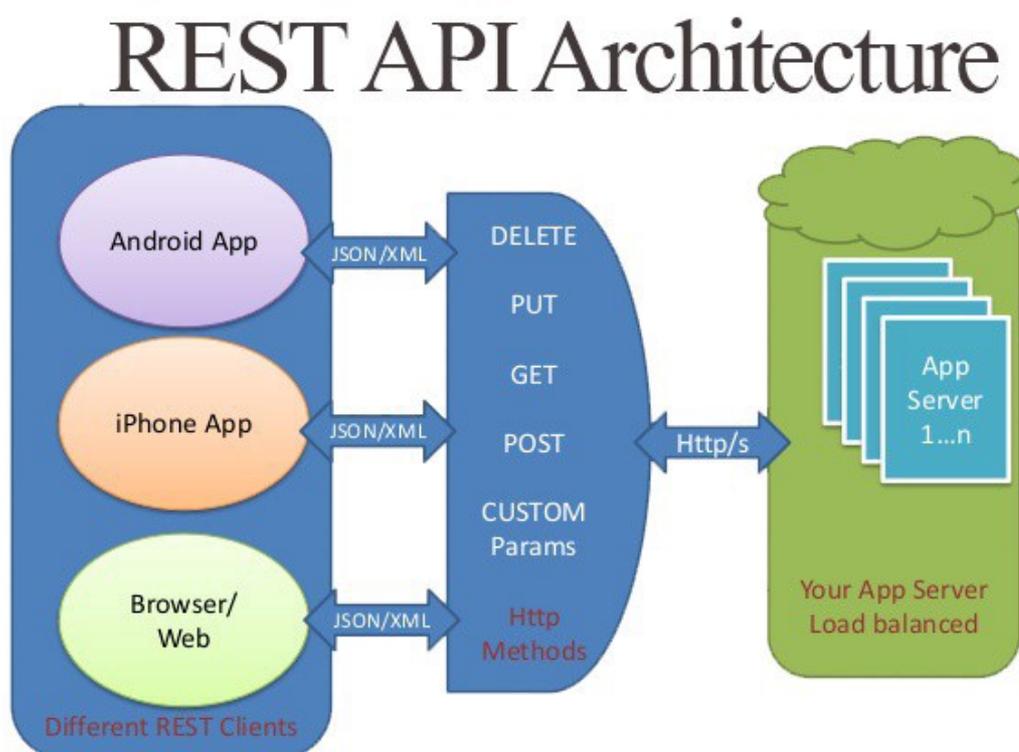
APIs are classified according to their target audience and scope. Developers work with four main different kinds of APIs. There are Private APIs, Public APIs, Partner APIs and Composite APIs. To increase productivity and transparency, private APIs are only made available to a company's internal team. Third-party developers cannot use these APIs unless they work for the company. Externally, partner APIs are shared, but only with those who have a business relationship with the company that provides the API. Some businesses use partner APIs to control who has access to their resources and how those resources are used. Open APIs, also known as public APIs, are open to the public. While some open APIs are free to use, others require a subscription fee, which is frequently tiered based on usage. Composite APIs allow to group calls or requests together to get a unified response from multiple servers. If data from multiple applications is required, consider using a composite API. Alternatively, instead of making five separate API calls in quick succession, a composite API can be used. (HubSpot 2022.)



PICTURE 4: Types of APIs (MOBILE APP DAILY 2021.)

2.4 REST APIs

A REST API (also known as a RESTful API) is an application programming interface (API or web API) that adheres to the REST architectural style and allows interaction with RESTful web services. Roy Fielding, a computer scientist, created REST, which stands for representational state transfer. (Red Hat 2020.)

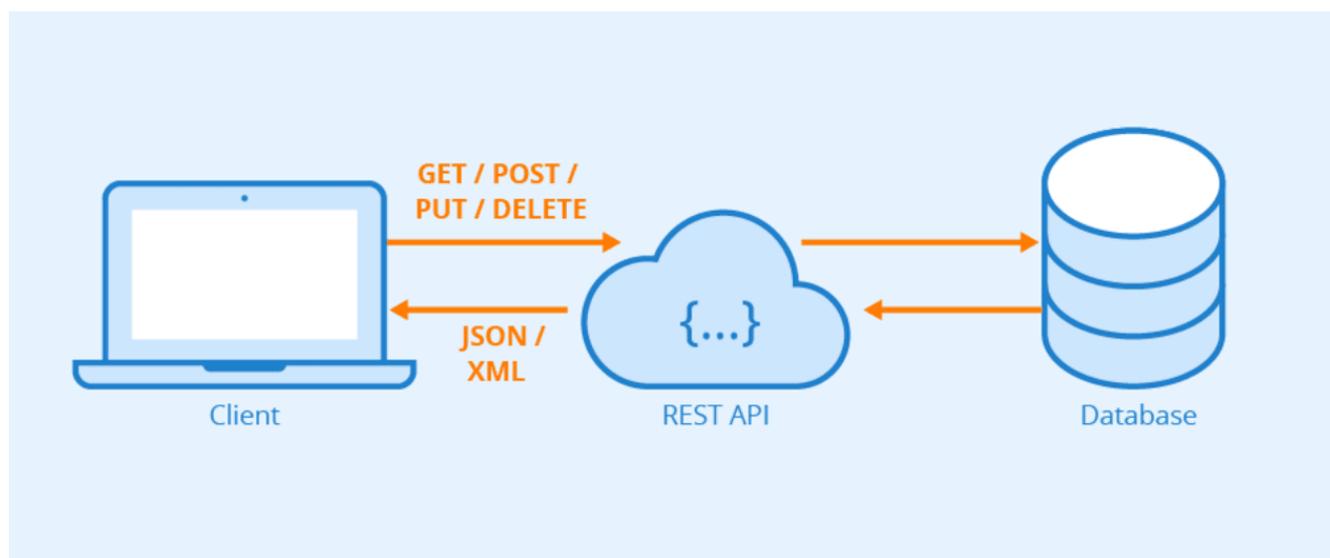


PICTURE 5: RESTful API Architecture (Davis 2019)

REST is an architectural constraint rather than a protocol or standard. REST can be implemented in a variety of ways by API developers. When a client requests a RESTful API, it sends a representation of the resource's state to the requester or endpoint. This data, or representation, is transmitted via HTTP in one of several formats: JSON (Javascript Object Notation), HTML, XLT, Python, PHP, or plain text. JSON is the most widely used file format because, despite its name, it is language-independent and readable by both humans and machines. (Red Hat 2020.)

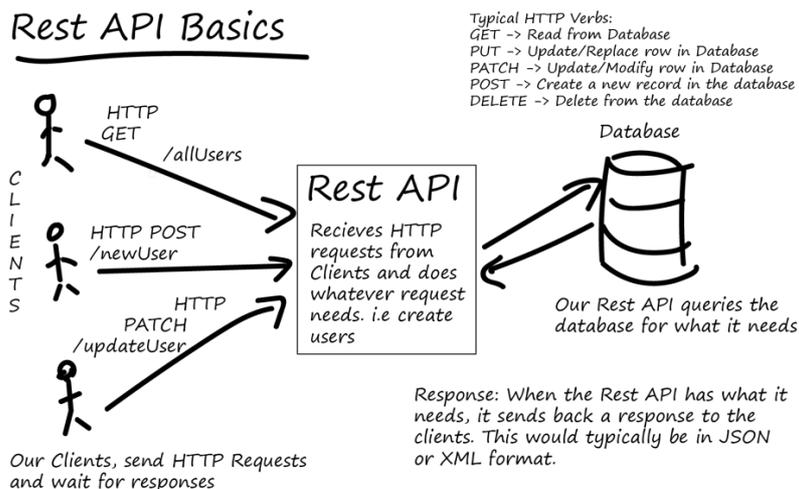
2.4.1 Architecture of REST

This API provides data access through a consistent and predefined set of operations. REST APIs are built on URLs and the HTTP protocol, as well as these six architectural constraints. Client-server architecture, where the client handles the front end and the server handles the backend, and both can be replaced independently. Uniform interface defines the interface between client and server and simplifies the architecture so that each component can be developed independently. Each request from client to server must be stateless and contain all the necessary information for the server to understand and process it appropriately. Cacheable keeps cached responses between client and server, avoiding extra processing. Layered systems are organized hierarchically so that each layer can only 'see' the layer with which it is interacting. Code-on-demand allows client functionality to be expanded by downloading and executing code in the form of applets and scripts. This simplifies things for clients by lowering the number of features that must be pre-implemented. (Davis 2019.)



PICTURE 6: RESTful API (dev.to 2020)

2.4.2 How it works



PICTURE 7: REST API basics

To process data, REST sends a request HTTP method such as GET, POST, PUT, DELETE, etc to a URI. These methods or operations are commonly referred to as CRUD, which stands for Create, Read, Update, and Delete. Each of the methods listed above must be passed by an API call in order for the server to receive instructions on what to do.

TABLE 1: RESTful API methods and actions

MEHTOD	ACTION
POST	(Create) Create a new Resource
GET	(Read) Returns a Resource or a list of Resources
PUT	(Update) Updating and replacing information for Resource
DELETE	(Delete) Delete a resource

2.5 Conclusion

Developers use APIs to build software and applications. The API is rarely accessed directly by the end user. The API serves as a gateway, allowing businesses to share specific information while preventing unwanted requests. APIs can make working life easier. As airlines share flight and price information,

travel aggregators can aggregate and compare it all. APIs are the foundation of all businesses. Sprout Social is an example of software built on top of social media APIs. If user 're using a third-party app to manage the social media, the lack of availability is most likely not due to an app bug. Most likely, the network's API does not include it. REST is not a technology, but rather a unified architecture that allows website designers to manage resources more easily. It is not a rule that must be followed, but rather a proposed architecture that is currently popular due to its simplicity, ease of understanding, and superiority. (dev.to 2022.)

3 GRAPH API

A Graph API, in its most basic form, is an API that models data as nodes and edges (objects and relationships) and allows the client to interact with multiple nodes in a single request. Consider a server that stores example about authors, blog posts, and comments. In a REST API, the client might make three HTTP requests to get the author and comments for a specific blog post, such as /posts/123, /authors/455, and /posts/123/comments. The client formulates the call in a graph API so that data from all three resources is pulled in at the same time. The client can also specify which fields it is interested in, giving it more control over the response schema. (Cooksey 2017.)

3.1 Facebook Graph API

The Graph API is the primary method for getting data into and out of Facebook platform. It is an HTTP-based API that apps can use to query data programmatically, post new stories, manage ads, upload photos, and do a variety of other things like posting comment. The Graph API takes its name from the concept of a "social graph," which is a representation of information on Facebook. It is made up of nodes, edges, and fields. Nodes are typically used to obtain data about a single object, edges to obtain collections of objects on a single object, and fields to obtain data about a single object or each object in a collection. It is referred to both a node and an edge as an "endpoint". "Send a GET request to the User endpoint," is an example. (Meta for Developers 2022.)

3.2 The structure of the Facebook Social Graph

Facebook API is a platform provided by Facebook for application developers to make it easier to create applications while also ensuring that application developers do not interfere too deeply in Facebook's system. People can obtain information about users via the Facebook API, such as friend list, personal information, profile picture, and so on, if they grant people access to their profile. (Meta for Developers 2022.)

3.2.1 HTTP

All data transfers are HTTP/1.1 compliant, and all endpoints require HTTPS. Because the Graph API is HTTP-based, it is compatible with any language that includes an HTTP library, such as cURL or urllib. This means that can use the Graph API in the browser. For example, in the browser, request this

URL: <https://graph.facebook.com/facebook/picture?redirect=false> . It is equivalent to making the following cURL request: (Meta for Developers 2022.)

```
curl -i -X GET "https://graph.facebook.com/facebook/picture?redirect=false"
```

CODE 1: Making cURL request. Running it in the Command Prompt or Terminal.

3.2.2 Host URL

Almost all request are passed to the graph.facebook.com host URL. The single exception is video uploads, which use graph-video.facebook.com. (Meta for Developers 2022.)

3.2.3 Access Tokens

Access tokens enable the app to make use of the Graph API. Almost all Graph API endpoints require access token, so the request may require one each time access one. They typically serve two purposes: they enable the app to access a user's data without requiring the user's password. For example, the app may require a user's email in order to perform a function. If the user agrees to allow the app to retrieve their email address from Facebook, they will not be required to enter their Facebook password in order for the app to retrieve their email address. They enable to identify the app, the user who is using it, and the type of data the user has granted the app access to. (Meta for Developers 2022.)

3.2.4 Nodes

A node is a distinct object with its unique ID. For example, there are numerous User node objects, each with a unique ID representing a Facebook user. The Facebook Social Graph includes nodes such as Pages, Groups, Posts, Photos, and Comments. The cURL example below represents a call to the User node: (Meta for Developers 2022.)

```
curl -i -X GET \  
  
"https://graph.facebook.com/USER-ID?access_token=ACCESS-TOKEN"
```

CODE 2: Calling the User node. Running it in the Command Prompt or Terminal.

By default, this request would return the following data in JSON format.

```
{  
  
  "name": "Your Name",  
  
  "id": "YOUR-USER-ID"  
  
}
```

CODE 3: It is responding of CODE 2 regarding calling user node.

3.2.5 Node Metadata

It will get a list of all fields of a node object, such as a User, Page, or Photo, including the field name, description, and data type. Send the following GET request to an object ID with the metadata=1 parameter: (Meta for Developers 2022.)

```
curl -i -X GET \  
  
  "https://graph.facebook.com/USER-ID?metadata=1&access_token=ACCESS-TOKEN"
```

CODE 4: Request for all fields of Node

The resulting JSON response will include the metadata property, which lists all of the supported fields for the given node.

```
{  
  
  "name": "Huong Nguyen",  
  
  "metadata": {  
  
    "fields": [  
  
      {
```

```
    "name": "id",

    "description": "The app user's App-Scoped User ID. This ID is unique
to the app and cannot be used by other apps.",

    "type": "numeric string"
},
{

    "name": "age_range",

    "description": "The age segment for this person expressed as a minimum
and maximum age. For example, more than 18, less than 21.",

    "type": "agerange"
},
{

    "name": "birthday",

    "description": "The person's birthday. This is a fixed format string,
like `MM/DD/YYYY`. However, people can control who can see the year they were
born separately from the month and day so this string can be only the year
(YYYY) or the month + day (MM/DD)",

    "type": "string"
},
...

```

CODE 5: It is responding of CODE 2 regarding calling all fields of Node

3.2.6 /me

The /me node is a special endpoint that translates to the object ID of the person or Page whose access token is currently being used to make API calls. If there is a user access token, it will get a User's name and ID by using:

```
curl -i -X GET \
  "https://graph.facebook.com/me?access_token=ACCESS-TOKEN"
```

CODE 6: Get username and ID through access token.

3.2.7 Edges

An edge is a connection between two nodes. A User node, for example, can be linked to photos, and a Photo node can be linked to comments. The following cURL example will return a list of photos that a user has shared on Facebook. (Meta for Developers 2022.)

```
curl -i -X GET \
  "https://graph.facebook.com/USER-ID/photos?access_token=ACCESS-TOKEN"
```

CODE 8: Get all of photos that people have shared on Facebook

Each returned ID represents a Photo node and the date and time it was uploaded to Facebook.

```
{
  "data": [
    {
      "created_time": "2017-06-06T18:04:10+0000",
      "id": "1353272134728652"
```

```

    },
    {
      "created_time": "2017-06-06T18:01:13+0000",
      "id": "1353269908062208"
    }
  ],
}

```

CODE 9: It is responding of CODE 8 regarding calling all photos that people have shared.

3.2.8 Fields

Fields are node properties. When querying a node or an edge, it returns a set of fields by default, as shown in the examples above. However, specify which fields returned by using the `fields` parameter and listing each field. This overrides the defaults and returns only the fields specify, as well as the object's ID, which is always returned. The `fields` parameter, as well as the User's name, email, and profile picture, are included in the following cURL request. (Meta for Developers 2022.)

```

curl -i -X GET \

  "https://graph.facebook.com/USER-
  ID?fields=id,name,email,picture&access_token=ACCESS-TOKEN"

{

// RETURN

  "id": "USER-ID",

  "name": "EXAMPLE NAME",

  "email": "EXAMPLE@EMAIL.COM",

```

```

"picture": {
  "data": {
    "height": 50,
    "is_silhouette": false,
    "url": "URL-FOR-USER-PROFILE-PICTURE",
    "width": 50
  }
}
}
}

```

CODE 10: Script and return result when calling fields.

Most parameter types are straightforward primitives such as bool, string and int, but there are also list and object types that can be specified in the request. The list type is specified in JSON syntax, for example: ["firstitem", "seconditem", "thirditem"]. The object type is also specified in JSON syntax, for example: {"firstkey": "firstvalue", "secondKey": 123}. (Meta for Developers 2022.)

3.2.9 Publishing, Updating, and Deleting

```

curl -i -X POST \

  "https://graph.facebook.com/USER-
  ID?email=YOURNEW@EMAILADDRESS.COM&access_token=ACCESS-TOKEN"

```

Read – After – Write. The Graph API can immediately read a successfully published or updated object and return any fields supported by the corresponding read endpoint for create and update endpoints. By default, the ID of the object that was created or updated is returned. Include the fields parameter in the

request and list the fields wanted returned to include more information in the response. (Meta for Developers 2022.). To publish the message "Hello" to a Page's feed, for example, it could be issuing the following request:

```
curl -i -X POST "https://graph.facebook.com/PAGE-ID/feed?message=Hello&fields=created_time,from,id,message&access_token=ACCESS-TOKEN"
```

CODE 11: Publish the "Hello" message to the Page's feed.

The code example above has been formatted for readability. This would result in a JSON-formatted response with the specified fields, as shown below:

```
{
  "created_time": "2017-04-06T22:04:21+0000",
  "from": {
    "name": "My Facebook Page",
    "id": "PAGE-ID"
  },
  "id": "POST_ID",
  "message": "Hello",
}
```

CODE 12: Responding result after CODE 11 is generated.

Errors. If the read fails for any reason (for example, requesting a field that does not exist), the Graph API will return a standard error response. A node, such as a Post or Photo node, can usually be deleted

by performing a DELETE operation on the object ID. Normally, people can only delete nodes that created, but check the reference guide for each node to see the requirements for delete operations. (Meta for Developers 2022.)

```
curl -i -X DELETE \ "https://graph.facebook.com/PHOTO-  
ID?access_token=ACCESSSTOKEN"
```

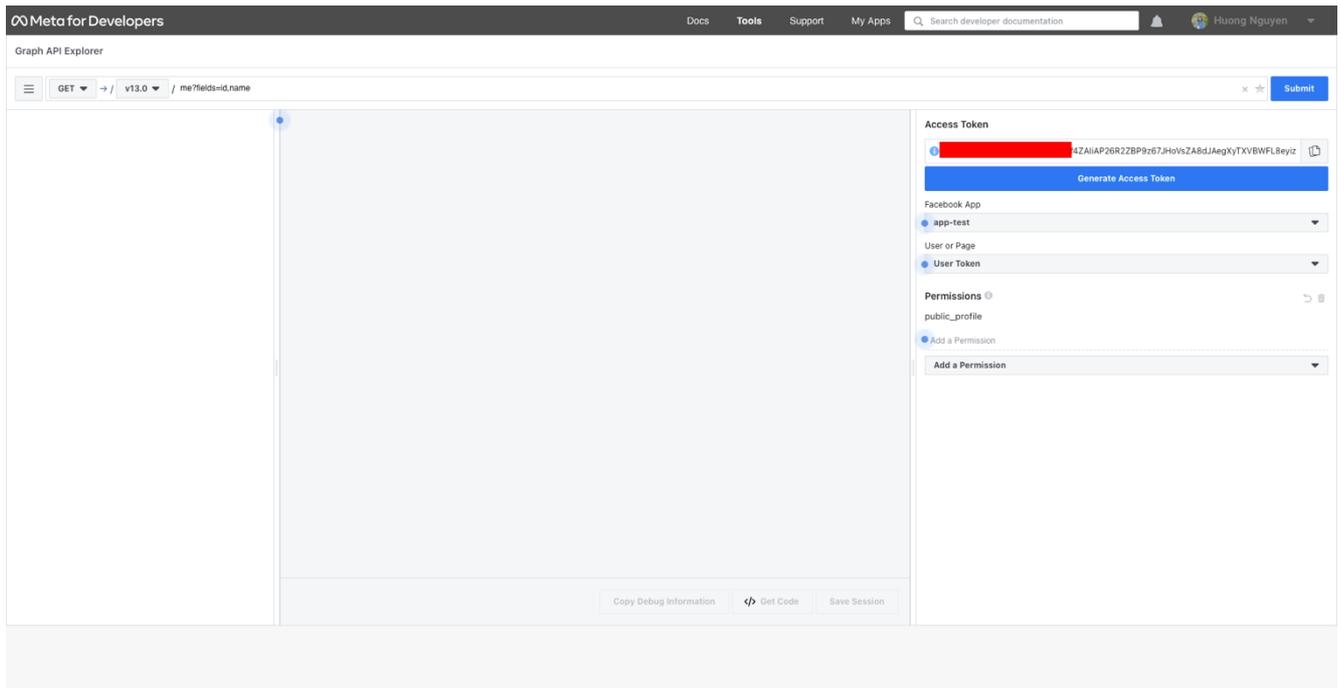
CODE 13: Deleting operation on the object ID

3.3 Using Facebook Graph API

This guide will walk through the process of receiving data from the Facebook Social Graph. Before starting, there are the needed things. Create an account as a Facebook Developer. A Facebook App – Because this app will only be used for testing, there is no need to include the app code when creating it. The Graph Explorer tool appears in a new browser window. (Meta for Developers 2022.)

3.3.1 First request

Accessing to this link: <https://developers.facebook.com/tools/explorer> . The explorer begins with a default query using the GET method, the most recent version of the Graph API, the /me node, and the id and name fields in the Query String Field, as well as Facebook App. (Meta for Developers 2022.)



PICTURE 8: Graph Explorer tool to access token and take general data

To generate an access token, click the “Generate Access Token” button. A window titled Log in With Facebook will appear. This popup is the app requesting permission to retrieve name and profile picture from Facebook. This flow is Facebook Login product, which allows users to log into apps with their Facebook credentials. Facebook Login enables an app to request access to a user's Facebook data and allow the user to accept or decline the request. Because name and profile picture are public, allowing people to find on Facebook, there are no additional requirements to run this request. (Meta for Developers 2022.)

A User Access Token is generated. This token contains information such as the app making the request, the person using the app to make a request, whether the access token is still valid (it expires in about an hour), the expiration time, and the scope of data the app can request. The scope in this request is `public_profile`, which includes name and profile picture. (Meta for Developers 2022.)

The screenshot shows the Facebook Developer Tools interface. At the top, there is a navigation bar with 'Docs', 'Tools', 'Support', and 'My Apps' links, a search bar for 'Search developer documentation', and a user profile for 'Huong Nguyen'. Below this, a 'Submit' button is visible in the top right corner of a window.

The main content area is divided into two panels. The left panel, titled 'Access Token Info', displays the following information:

Access Token Info	
App	[Redacted] : app-test
User	[Redacted] : Huong Nguyen
Valid	True
Expiration Time	1654632000 (Tue Jun 07 2022 23:00:00 GMT+0300 (EEST))
Scopes	public_profile
Graph Domain	Facebook

Below the table is a button labeled 'Open in Access Token Tool'.

The right panel, titled 'Access Token', shows the generated token: `[Redacted]ZCZBnLL099AM5aJ3SSqtPDBRr9AoiZCRdrEKZAEogHWSE07IGL`. Below the token is a blue button labeled 'Generate Access Token'. Underneath, there are dropdown menus for 'Facebook App' (set to 'app-test') and 'User or Page' (set to 'User Token'). A 'Permissions' section shows 'public_profile' with an 'Add a Permission' button below it.

PICTURE 9: Token's information is show after generating the token

In the upper right corner, press the Submit button. A JSON response with Facebook User ID and name will appear in the Response Window. If “?fields=id,name” removed from the query string field and click Submit, it will get the same result because name and id are the default User node fields. (Meta for Developers 2022.)

It is worth noting that the id values returned in the response window are links. These hyperlinks can represent nodes like User, Page, or Post. When clicking a link, the ID replaces the query string field's contents. Now can run requests on that node. Its may do not need to add permissions to this node because it is linked to the parent node, a Post of a User. Now selecting a Post ID because it will be used in the next example. Please keep in mind that some IDs are a combination of the parent ID and a new ID string. A User's Post, for example, will have a Post ID that looks like this:

2968723763438832_3030329857278222, where 2968723763438832 is the User ID. (Meta for Developers 2022.)

3.4 Conclusion

Facebook API is essentially the platform that Facebook provides for programmers to easily create applications linked to Facebook accounts while ensuring that programmers do not interfere too deeply with the world's largest social network's system. Programmers can use the Facebook API to obtain information about Facebook users, groups, photos, and so on. Not only Facebook, but API platforms are also provided to developers by services such as Google, Yahoo, Amazon, and other large corporations. Using this API, people can create applications that use this feature or existing data on their servers.

4 WORKING WITH FACEBOOK GRAPH API

The Facebook Platform is a collection of services, tools, and products made available by the social networking service Facebook to third-party developers for them to create their own applications and services that access Facebook data. Not just a social network, Facebook has evolved into one of the social networks that plays a significant role in the advancement of the entertainment and knowledge industries, particularly in the field of marketing. People who use Facebook wisely can make a lot of money from the social networking site through advertising and business branding. Therefore, the management of the sales page is one of the important factors that help users make a profit from their brand. (Meta for Developers 2022.). Visit this link to learn more about the documents and tools, learn the basics of how to send and receive data from the Facebook Social Graph and how to implement the APIs, Platforms, Products, and SDKs to fit the application needs:

<https://developers.facebook.com/docs/>

Firstly, register as a Facebook developer and use App Dashboard to provide information about the app before using any of products and SDKs or access any of APIs. The Graph API is the primary interface through which apps can read and write to the Facebook social graph. Because all of SDKs and products interact in some way with the Graph API, and other APIs are extensions of the Graph API, understanding how the Graph API works is critical. App Review is a step in the app development process that allows to ensure that the app uses Products and APIs in an approved manner. If anyone who does not have a Role on the app or a role in a Business that has claimed the app will use it, it must first go through App Review. (Meta for Developers 2022.)

4.1 App Integrations

Application integration is the process of allowing independently designed applications to communicate with one another. Keeping separate copies of data (in independently designed applications) consistent, orchestrating the integrated flow of multiple activities performed by disparate applications, and providing access to data and functionality from independently designed applications through what appears to be a single user interface or application service are all examples of commonly required capabilities. (Gartner 2022.)

4.1.1 App Events

App Events enables to track actions that take place in the mobile app or web page, such as app installs and purchase events. People can measure ad performance and build audiences for ad targeting by tracking these events. App Events are classified into three types: Automatically Logged Events - The Facebook SDK logs app installs, app sessions, and in-app purchases automatically. Standard Events - Popular events created by Facebook. Custom Events - These are events that created that are unique to the app. (Meta for Developers 2022.)

An app event consists of three parts. Name is a string that must be provided to describe the event. When the app event is sent to Facebook Events Manager, the name appears in the Event log. valueToSum is an optional value that Analytics appends to other Value To Sum values from the same app event. parameters are optional values that are included with the app event. There is a limit of 1,000 different event names. Note: Once this limit is reached, no new event types will be logged, and exceeding it may result in a 100 Invalid parameter error when logging. However, obsolete events can be deactivated. (Meta for Developers 2022.)

4.1.2 App Links

App Links is an open standard that allows to deep link to content within the app. When a user of the app shares content to Facebook or another App Links-enabled app, people can create a link that allows them to return to the app from that piece of content. App Links function by adding metadata to existing web URLs so that people can be consumed by the app. App Links are now supported by the Facebook iOS and Android apps. When the Facebook app encounters a link that supports App Links, it will launch the app with the appropriate information so that the content can be viewed immediately and quickly. (Meta for Developers 2022.)

On Facebook, a user clicks on a story. People can view the content in the app if someone shares a story on Facebook with content from other app. App Link metadata is included in the URL shared with Facebook. The Facebook app looks up the URL to determine whether it supports App Links. When a user clicks on a story, the Facebook App checks to see if the content supports App Links. If it does, the Facebook App directs users to content, either in a web view or by launching app and linking to it, based on the following criteria: Regardless of whether people have app installed, regardless of whether the device is an Android or an iOS device, whether app is only available on mobile devices. App Links

requires the following: If the content is a web page, the web page must include markup to tell the app which app to launch. Even if the content is only for mobile, users must still provide a valid http(s) URL that hosts the App Link metadata. In order to accept incoming App Links, app must be configured to do so. This is covered for both iOS and Android. (Meta for Developers 2022.)

4.1.3 Audience Network

Audience Network monetizes mobile property with Facebook ads. App Bidding assists publishers in establishing an impartial and open auction over the ad inventory by offering every ad opportunity in real time to multiple demand sources. Among the advantages are the ability to optimize for each ad request, resulting in more revenue, visibility into the true value of inventory, and ease of maintenance with fewer ad ops resources. (Meta for Developers 2022.)

4.1.4 Group APIs

The Groups API is a set of Graph API endpoints that allow to read and create data from Facebook Groups on behalf of group members. A group admin can grant the app access to group content, such as posts, photos, and videos, and allow to publish content to the group on behalf of the admin by installing app on the group. Administrators can also grant access to publicly available information about group members who have chosen to share publicly available information with apps installed on the group. (Meta for Developers 2022.)

The requirements are following groups API. Groups API employs a two-tiered API access level system, Standard and Advanced. Standard level access allows to get data only from users who have a role in app, whereas Advanced level access allows to get data from all users in the group where the app is installed. App Review is required for advanced API access. It includes the following features and permissions with submission to gain access. (Meta for Developers 2022.)

4.1.5 Instagram Platform

Instagram platform is tools to help business interact with Instagram users. In business APIs, Users can access data in their Instagram Business and Instagram Creator accounts using the Instagram Graph API. The API can be used to obtain and publish media, manage and respond to comments on media, identify media where they have been @mentioned by other Instagram users, find hashtagged media,

and obtain basic metadata and metrics about other Instagram Businesses and Creators. (Meta for Developers 2022.)

Consumer APIs, The Instagram Basic Display API enables app's users to retrieve basic profile information, photos, and videos from their Instagram accounts. The API is intended for Instagram users who are not business or creators. Use the Instagram Graph API instead if people are creating an app that will allow users to publish media, moderate comments, identify @mentioned and hashtagged media, or get data about other Instagram users. People can use Sharing to Stories to allow app's users to share their content as Instagram stories. Sharing to Feed allows app's users to share their content to their Instagram Feed. Embed Instagram photo and video posts in other websites. (Meta for Developers 2022.)

4.1.6 Pages API

The Pages API allows apps to access and update the settings and content of a Facebook Page, create and get Posts, get Comments on Page owned content, get Page insights, update actions that Users can perform on a Page, and much more. Pages components are access tokens, permissions, features, tasks, page-scoped user IDs, rate limits. (Meta for Developers 2022.)

This is a typical flow for interacting with the Pages API. It obtains a User Access Token from the app User via Facebook Login, query the /me/accounts endpoint to obtain the ID and Page Access Token of the Page that the app User has granted access to app, capture the returned Page ID and Page Access Token, and use the ID and token to query the Page node. It should be noted that the app User may grant app access to more than one Page in some cases, in which case user should capture each Page ID and its associated token and provide a way for the app User to target each of those Pages. (Meta for Developers 2022.)

4.1.7 Webhooks

Webhooks allow to receive real-time HTTP notifications when certain objects in the Facebook Social Graph change. For example, Facebook could notify whenever one of app Users changes their email address or comments on Facebook Page. This saves from querying the Graph API for changes to objects that may or may not have occurred, and it keeps user from exceeding rate limit. (Meta for Developers 2022.)

Because there are many different types of objects in the Facebook Social Graph, such as User objects and Page objects, users must first select an object type when configuring a Webhook. Users must subscribe to specific fields for that object type because different objects have different fields. Facebook will send a notification whenever the value of any object field users has subscribed to changes. Notifications are delivered to users as HTTP POST requests with a JSON payload describing the change. Assume that set up a User Webhook and subscribed to the Photos field, if one of app's Users uploads a photo, Facebook will send a notification like this: (Meta for Developers 2022.)

```
{
  "entry": [
    {
      "time": 1520383571,
      "changes": [
        {
          "field": "photos",
          "value": {
            "verb": "update",
            "object_id": "10211885744794461"
          }
        }
      ]
    },
    {
      "id": "10210299214172187",
      "uid": "10210299214172187"
    }
  ]
}
```

```
],  
  "object": "user"  
}
```

Because webhooks are sent over HTTPS, server must be capable of receiving and processing HTTPS requests, as well as have a valid TLS/SSL certificate installed. Certificates that have been self-signed are not supported. App Review is not required for Webhooks. However, in order to receive Webhooks notifications of changes to objects while app is in Live mode, app must have been granted the necessary access permissions. (Meta for Developers 2022.)

App Review is typically required before an app can be made public. Apps can request approval for specific permissions during review, which control the types of data the app can access when using the Graph API. Although App Review is not required for the Webhooks product, it does respect permissions. This means that even if people set up a Webhook and subscribe to specific fields on an object type, they will not receive notifications of changes to an object of that type unless and until the following conditions are met app has been granted the permission(s) associated with that type of data, and the object that owns the data has granted app access to that data (e.g., a User allowing app to access their Feed). (Meta for Developers 2022.)

Live webhook notifications will not be received by apps in development mode. Only test notifications initiated through the app dashboard will be sent while an app is in development mode. It's worth noting that Messenger Webhooks Events behave differently in development mode. (Meta for Developers 2022.)

4.2 Authentication

Instead of creating a unique sign-in, Facebook Login allows visitors to log in using their Facebook profile. When a visitor logs in with Facebook, they also grant access to certain pieces of information. That information may include email, public profile, likes and interests, friends. Allowing users to log in with their Facebook accounts has several advantages for both developers and the user. (Meta for Developers 2022.)

4.2.1 Facebook Login

Facebook Login allows people to create accounts and log into app across multiple platforms quickly and easily. It is available on iOS, Android, the Web, desktop apps, and devices like Smart TVs and Internet of Things objects. Facebook Login supports two scenarios: authentication and the request of permission to access people's data. Facebook Login can be used solely for authentication or for both authentication and data access. (Meta for Developers 2022.)

Facebook Login is required to access the following features: Account Setup and Personalization. Facebook Login allows people to create an account in app quickly and easily without having to set (and likely forget) a password. This simple and convenient experience increases conversion. Once someone creates an account on one platform, they can log into app on all other platforms, often with a single click. A validated email address indicates that developers can contact that person in the future to re-engage them. Personalized experiences are more engaging and result in greater retention. Facebook Login allows to access information that would be difficult or time-consuming to collect through own registration form. Simply importing someone's Facebook profile picture gives them a stronger sense of connection with app. (Meta for Developers 2022.)

Facebook login features are real identity, cross platform login, works alongside existing account system, granular permissions, people have control over what they share, gradual authorization, express login, Facebook lite integration for Android apps.

4.2.2 Limited Login

A Limited Login mode is available on Facebook Login. When using the limited version of Facebook Login, the fact that someone used Facebook Login with the app is not used to personalize or measure the effectiveness of advertising. (Meta for Developers 2022.)

Limited Login returns an AuthenticationToken, which is an OpenID Connect token wrapped in an AuthenticationToken. The ID token cannot be used to obtain other tokens, such as Page or session info tokens, or to request additional data via the Graph API, such as friends, photos, or pages. This necessitates the use of traditional Facebook Login (which does not support Limited Login safeguards). A successful login creates a global instance of AuthenticationToken. People can specify a nonce for the login attempt, which will be included in the returned token for validation. Furthermore, Limited Login

creates a shared profile instance with basic information such as app-scoped ID, name, and profile picture. Other information can be included if the user agrees. (Meta for Developers 2022.)

4.2.3 Login Connect with Messenger

Users can now communicate with business via Messenger Platform directly from the Facebook Login flow on mobile app or website with Login Connect with Messenger. By communicating with more customers on the channel they prefer, developers can deepen their user engagement and provide stronger, more efficient customer care. Messenger Platform enables Page to automate messaging experience, reducing the time team spends answering basic requests while still providing excellent customer service. (Meta for Developers 2022.)

When a user visits a third-party site or mobile app and logs in with Facebook Login, they will see a screen inviting them to allow the business to contact them via Messenger to provide offers, support. If a user opts in to receiving communications from a business through Messenger, the business has 24 hours from the time the user opts in to send the first message to the user via Messenger Platform. Before going live, the messaging experience including all follow-up messages from the business must comply with Developer Policies, including Developer Documentation for Messenger Platform, and must be reviewed through app review process. (Meta for Developers 2022.)

Login Connect with Messenger experience will need to be submitted for App Review, requesting `user_messenger_contact` permission as well as `pages_messaging` permission if the messaging app does not already have them granted. Before submitting app experience for App Review, require the following: commercial verification, an app of the Consumer or Business app type that uses Facebook Login and requests the user messenger contact permission via App Review, a public Facebook Page for a website or entity that uses Facebook Login to request user opt-in to messaging. Check that the Page has granted pages messaging permission to a Messenger Product-configured app. This could be the same app as the Facebook Login app or a different app. If using the same app for login and messaging and it does not already have pages messaging granted, people can request it in the same review. Check that app meets the App Review requirements. (Meta for Developers 2022.)

4.3 Developer Guides

People must first register as a Facebook developer and use App Dashboard to provide information about app before can implement any of products and SDKs or access any APIs. These documents explain how to register as a developer, how to configure app's settings using the App Dashboard, and how to build, test, and release app. (Meta for Developers 2022.)

4.3.1 App Review

People can use App Review to request approval for specific permissions and features. Approved permissions can be requested by any app user, but unapproved permissions can only be requested by app users who have a role on the requesting app. Similarly, approved features are available to all app users, whereas unapproved features are only available to app users with a role. Facebook will test app as part of the review process to ensure that it uses the permissions and features that requested. The entire submission will be rejected if Facebook is unable to access app to test it. They will not approve for that permission or feature if they are able to test app but are unable to test functionality that requires a specific permission or feature that requested. Important Information Facebook will test app to ensure that it is accessible. Check that app is in Development mode or is of the Business app type. When they test app, they will refer to screen recordings, so make sure they demonstrate actions that require the permissions and features that requested. Any requested permission or feature that does not include a screen recording will be denied. (Meta for Developers 2022.)

4.3.2 Developer Policies

Facebook Platform is a collection of APIs, SDKs, tools, plugins, code, technology, content, and services that enable others, such as app developers and website operators, to develop functionality, retrieve data from Meta and other Meta Products, and provide data to Facebook. To use the Platform, people must agree to and follow these Developer Policies and all other Developer Docs, which are all part of and hereby incorporated by reference into the Platform Terms. Capitalized terms that are not defined elsewhere have the meaning specified in the Platform Terms. To be clear, people agree that access to and use of the Platform is governed by the Platform Terms as well as all other applicable terms and policies. Beside those developers must follow the terms at Meta Platform Terms and Privacy & Consent. Visiting this link to learn more: <https://developers.facebook.com/terms> , <https://developers.facebook.com/docs/privacy> (Meta for Developers 2022.)

4.4 Business Messaging

Facebook Messenger is a Facebook-developed cross-platform instant messaging app (now Meta). Messenger, with nearly 1 billion monthly users, can be an invaluable marketing tool for brands looking to connect with customers on Facebook. If people use Facebook Messenger correctly, it can be an important part of Facebook marketing strategy. It is the most popular messenger app in the United States, with 82 percent of consumers claiming to use it regularly for instant messaging. (Sheikh 2022.)

4.4.1 WhatsApp Business Platform

The WhatsApp Business Platform enables medium to large businesses to connect with customers on a large scale. People can start conversations with customers in minutes, send customer care notifications or purchase updates, provide personalized service, and support in the channel that customers prefer. Businesses can connect thousands of agents and bots to interact with customers programmatically and manually using APIs. Furthermore, the APIs can be integrated with a variety of backend systems, including CRM and marketing platforms. (Meta for Developers 2022.)

WhatsApp Business Platform APIs include the following Cloud API, On-premises API and Business Management API. Cloud API sends and receives messages from and to customers via Meta's cloud-based servers, which host the WhatsApp Business API client. The Cloud API enables to implement WhatsApp Business APIs without the cost of hosting own servers, as well as scale business messaging more easily. On-premises sends and receives messages to and from customers by hosting the WhatsApp Business API client on own servers. Business Management API manages WhatsApp Business Account settings and assets programmatically and receive quality status updates. (Meta for Developers 2022.)

To send messages through the WhatsApp Business Platform, users will need a name that will appear in the WhatsApp messages that customers see, a phone number associated with business account, a WhatsApp Business Account, and a Meta Business Manager. (Meta for Developers 2022.)

4.4.2 Messenger Platform

Messenger from Meta is a messaging service that allows a company's Facebook Page or Instagram Business account to respond to customer questions about the goods and services it offers.

Conversations between a customer or potential customer and a business must be initiated by the customer. A customer messages company while logged in to Facebook or Instagram, or via a Meta plugin while visiting mobile app or website. Company can use the Messenger Platform to handle customer messages by sending automated responses, having a live agent respond, or a combination of both. (Meta for Developers 2022.)

About the messaging flow, when a customer messages company, a webhook is triggered, notifying that Business Page or Instagram Professional account has received a message. The app can then query the Meta social graph for this conversation, determine the appropriate response, and respond to the customer. The platform enables to do this on a large scale and offers a wide range of conversation entry points and message templates. If a company sends more than 40 messages per second or is constantly sending or receiving messages in many conversations at the same time, new messages will not appear in the Inbox, and the company will be unable to send new messages until the message volume decreases. Pages that consistently exceed this limit should use the Messenger Platform to avoid messaging disruptions. User can safely send up to 250 messages per second using the Messenger Platform. A customer who is logged into Facebook cannot send a message to Instagram Professional account, nor can a customer who is logged into Facebook send a message to Facebook Business Page. (Meta for Developers 2022.)

4.5 Marketing and Commerce

Facebook, with its vast network of social connections, has always served as a portal for all businesses seeking to establish themselves. As more businesses continue to flood Facebook with content, competition is heating up. It appears to be extremely difficult to maintain dominance and dominance on Facebook. However, there is a way to increase reach and traction on Facebook posts. Everything is dependent on Facebook's engagement. Businesses can reach a larger audience organically and establish a customer base by increasing content engagement. (Meta for Developers 2022.)

4.5.1 Facebook App Ads

App advertisements allow to promote app on Facebook, Messenger, Instagram, and Audience Network. Meta Ads Manager allows to create manual app ads as well as Meta Advantage+ App Campaigns. People can use app ads to find new users. Select the App Installs goal to promote the app to people who are most likely to download it from their preferred app store. Reactivate existing users promotes the app to get people to do something specific, such as make a purchase or complete a level in a game. Allow users to try out the app, use playable ads to provide a brief, interactive preview of app so that users can try it before downloading it. (Meta – Meta Business Help Center 2022.)

4.5.2 Automotive Ads

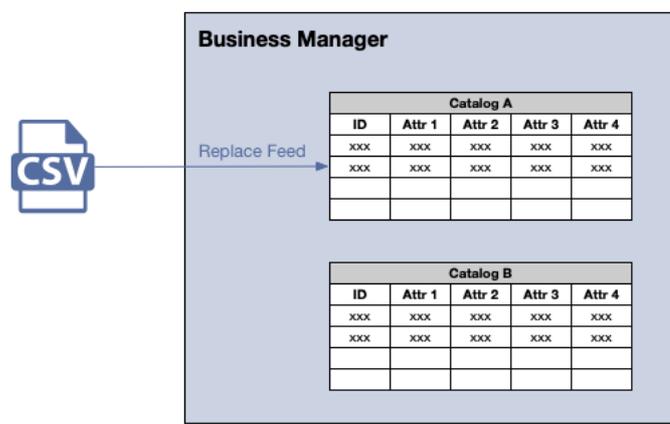
Facebook's automotive ads use cross-device intent signals to automatically promote relevant vehicles from inventory with unique creatives on Facebook. Automotive ads is a vertical solution for the automotive industry that includes a custom creative format, data models, and ad delivery optimization for automotive clients. (Meta for Developers 2022.)

Common Uses of automotive Ads is Automotive Inventory Ads, Automotive Offer Ads. Facebook matches the vehicle from catalog with people whose Facebook activity suggests they are interested. Facebook determines which vehicle to display by analyzing intent signals from people who are both on and off the Facebook apps, as well as those who exhibit similar characteristics. Contact Facebook representative for an example of an automotive inventory. Users should optimize for automotive detail pages and cost per action as measured by Facebook pixel. Compare this to website conversion ads and/or campaigns if currently using automotive inventory ads. (Meta for Developers 2022.)

People should use automotive inventory ads if they current use ads to drive automotive sales. Or they already use non-automotive inventory ads on Facebook to drive sales and traffic from new customers, and they want to improve ad performance and automate their work so that more products from their catalog can be advertised. They want an always-on solution that engages existing customers while driving traffic and converting new customers to grow their business. About Facebook's automotive offer ads, it uses cross-device intent signals to promote relevant vehicle offers on Facebook automatically. An automotive offers catalog contains information about the offers, the vehicles that go with them, and the markets/regions where the offer is valid.

4.5.3 Product Catalog

People must upload their product information into a Facebook Product Catalog before buyers can purchase from them. If they advertise with Facebook Dynamic Product ads, they already have a Product Catalog that should be supplemented. If they do not have a Product Catalog or do not want to reuse an existing one, they can use the Commerce Manager to create a new E-Commerce catalog. Meta Business Manager is where people manage their product catalogs. Their Marketing department may already have a Facebook Business page set up to manage Ads campaigns on their behalf and should be able to provide them with access. If they do not already have a Business Manager on Facebook, they can set one up right now by following the steps in Help Center. (Meta for Developers 2022.)



PICTURE 13: Product Catalog of Facebook Platform (Meta for Developers 2022.)

The following methods are used to create, update, and delete products. In Commerce Manager, user can do it bulk by uploading Product Feed file, manually, or schedule it. For current products, it is using the Catalog Product Items Batch API, update product quantity_to_sell_on_Facebook (the field representing inventory count). In bulk by manually uploading a Supplementary Feed, scheduling it in Commerce Manager, or using the Product Feed API. (Meta for Developers 2022.)

A catalog is a structured data file that contains information about inventory's items. Each row in catalog represents a distinct product (variant in size/color). Each column in catalog represents a different product attribute, such as the title, description, image. The complete list of attributes and their requirements can be found here: <https://developers.facebook.com/docs/commerce-platform/catalog/fields#model>

TABLE 2: Catalog example

id	title	gender	size	color	inventory	price	item_group_id
0475-S	T-Shirt	Unisex	S	Black	35	7.43	0475
0475-M	T-Shirt	Unisex	M	Black	125	7.43	0475
0475-L	T-Shirt	Unisex	L	Black	12	7.43	0475
0883	Shorts	Unisex			3	26.55	0883

There are several methods for populating catalog. The most common method is to list all of products and attributes in a flat file in one of the supported formats (CSV, TSV, RSS XML, ATOM XML, and Google Sheets), and then upload it as a Catalog Feed. People can create one or more Product Feeds after they have created their Product Catalog to update or replace product items in the catalog. Product feeds can be manually or automatically uploaded using a schedule (hourly, daily or weekly). For a given Product Feed, two types of schedules are supported: Replace Schedule and Update Schedule. (Meta for Developers 2022.)

4.5.4 Commerce Platform

The Commerce platform allows ecommerce solutions and retailers to deeply integrate their infrastructure with the tools available to sell their products across the Facebook Family of apps, which includes Facebook Shops, Marketplace, and Instagram Shopping. It allows direct sellers and platform partners to create a seller onboarding experience as well as manage their product catalog and order management flows using the Graph API. (Meta for Developers 2022.)

4.5.5 Facebook Business SDK

The Facebook Business SDK provides with access to suite of business APIs, allowing people to create unique and customized solutions for the customers and businesses. Common uses of the Facebook business SDK are Ads buying, Instagram Management, Onboarding Clients at Scale and Page Management. Ads buying creates ad campaigns for Click to Messenger Ads and promote Facebook Page with this guide. Instagram publishing and commenting guide. Onboarding Clients at Scale is a guide for managing hundreds or thousands of small businesses and providing them with ad buying opportunities on website or platform. Page Management is a guide to creating pages, updating pages, and managing Page content. (Meta for Developers 2022.)

The Facebook Software Development Kit allows third-party developers to create Facebook applications. Whether it is a birthday greeting app, an online multiplayer strategy people play with Facebook friends, or programming managing a business page. The Facebook SDKs include Facebook APIs such as Live streaming and the Graph API. Facebook provides a variety of SDKs for various platforms and programming languages. For example, a business SDK for Android, IOS, JavaScript, PC games, PHP, React, Swift, and Unity. An SDK for developing television apps. There are also third-party SDKs developed by the active community of developers building Facebook applications. Spring Social for Java, Graph for Nodejs, and Microsoft's Windows SDK for Facebook are a few examples. (Shivang 2022.)

4.5.6 Meta Pay Integration



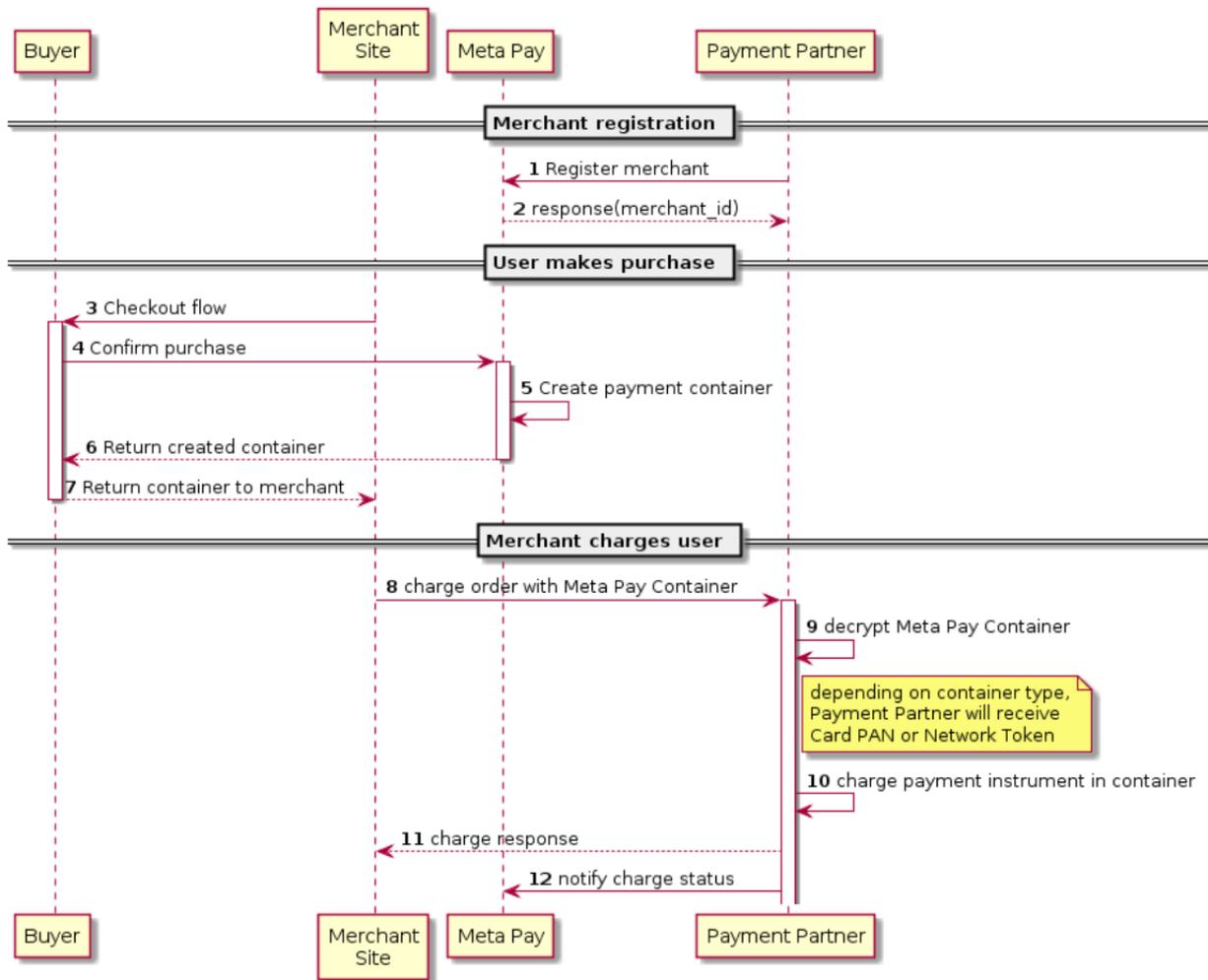
PICTURE 14: Meta Pay button

Customers can use the Meta Pay button to check out if owners integrate Meta Pay into their online store. Meta Pay is a simple and secure way for customers to make online payments. Payment proces-

sors authorize or decline payments and record payment activity, while merchants use Meta Pay to create and submit payment transactions. Payment providers must notify Meta of Payment transaction activity so that it appears in the customers' Facebook Pay Activity page. (Meta for Developers 2022.)

Before users can integrate Meta Pay into their online store or accept Meta Pay payments, they must meet the following requirements: Users must use the Payment Card Industry Data Security Standard to process raw card data (PCI-DSS), they must not rely on a third-party to host their website's checkout experience. To create the Meta Pay button and display it on their website in the checkout user interface, they must be able to use the JavaScript SDK for Meta Pay. By integrating with the Meta Pay API and using webhooks, users must notify Meta of payment transaction activity. (Meta for Developers 2022.)

The following is a simplified version of the Meta Pay workflow. Payment Partner adds a merchant to Meta pay. The Meta Pay button is displayed in the checkout user interface by the merchant site. The customer clicks the Meta Pay button (JavaScript SDK). The merchant site displays the Meta Pay payment sheet, which the customer fills out (SDK for JavaScript). The customer presses the Pay button. The payment details are submitted to the payment partner by the merchant site (SDK for JavaScript). The payment partner either approves or rejects the payment. The payment partner notifies Meta of all transaction-related activity, such as captures, authorizations, payments, disputes, and refunds. (Meta for Developers 2022.)



PICTURE 15: Meta Pay workflow

4.5.7 Marketing API

The Marketing API is a collection of Graph API endpoints and other features that can be used to assist people with Facebook advertising. To get started with Facebook advertising, Facebook recommends learning about Facebook's Ad Campaign Structure so people can understand the objects people are working with and how they relate to one another. The Marketing API is an HTTP-based API that allows people to query data programmatically, create and manage ads, and perform a variety of other tasks. Because the API is HTTP-based, it is compatible with any language or software that supports HTTP, such as cURL and nearly all modern web browsers. Because the Marketing API is based on Facebook's Graph API, almost all requests should be directed to the `graph.facebook.com` host URL. (Meta for Developers 2022.)

Marketing API common uses are following. Automate Ad Management creates multiple ad templates at the same time to test different creative, bidding or tagging strategies. Leverage Dynamic Creative creates different permutations to find the most effective creative for audience. Create Data-Based Audience integrates CRM system with API to easily create audience segments. Optimize in Real Time is using rules-based ad management, people can manage and optimize ads in real time. Building Custom Dashboards creates dashboards to compare the performance of Facebook ads to the performance of ads on other advertising channels. (Meta for Developers 2022.)

Basic concepts of Marketing API are Ad Campaign Structure, Authorization, Authentication, Rate Limiting, Versioning, App Review, Permissions, Error Codes, Post-Processing.

4.6 Gaming

Unlock access to the audience, tools, and support to take game to the next level. With cross-platform solutions, people can include their game on Facebook Gaming. There are numerous methods for launching games on Facebook. Create an Instant Game, a Cloud Game, or combine the capabilities of a native game with integrations that connect to the larger Facebook community. Facebook Gaming helps acquire New Players. With over 900 million people playing games, watching gaming videos, or participating in gaming groups on Facebook each month, owners can expose their game to a large global audience. Players can encourage the competitive spirit of gaming by creating and sharing a tournament on their Facebook feed, as well as inviting friends to game to play instantly with no installation required. With meaningful social gaming experiences, people can keep their audience engaged. Make custom Messenger updates, use Facebook Login for gaming, and enable Cross-play to keep players engaged and connected no matter where they play. Drive incremental revenue, earn extra money with in-app ads and in-game purchases. With Meta Audience Network, people can optimize their game's performance with insights, a ROAS dashboard, and increased monetization potential. (Meta for Developers 2022.)

4.7 SDKs

There are kind of SDKs: Facebook SDK for Android, Facebook SDK for IOS, Facebook SDK for JavaScript, Facebook SDK for PHP, Facebook SDK for tvOS, Unity SDK, Facebook Business SDK. In general, of the Facebook SDK, the Facebook SDK enables mobile app developers to integrate Face-

book into their apps. SDK stands for software development kit, and it allows a website or app to seamlessly integrate with Facebook. Here are some examples of what people can do with the Facebook SDK: Facebook Login functionality, Facebook content sharing, social plugins. (Meta for Developers 2022.)

More importantly, it is what enables people to send data from their mobile app to Facebook ads. People can then use it to do things like retarget people, track conversions, and more, just like the Facebook pixel. Understanding and using a Facebook SDK is essential if people are in charge of marketing a mobile app. (Nataf 2018.)

4.7.1 Facebook SDK for Android

Using the Facebook SDK for Android, integrate Android App with Facebook to create engaging social apps. People can use the Facebook SDK for Android to access the following features. Facebook Login is a safe and convenient way for people to use their Facebook credentials to log into the app or website. Sharing allows users to post to Facebook directly from the app. People have the ability to share, send messages, and share stories. App Events understands the app's users' actions and measure the effectiveness of the Mobile App Ads. Advertise the app uses Mobile App Install Ads to increase app installs. Using Mobile App Engagement Ads, people can increase app engagement. Custom Audiences for Mobile Apps can help people find their target audience. (Meta for Developers 2022.)

4.7.2 Facebook SDK for IOS

Using the Facebook SDK for IOS, people can integrate ISO app with Facebook to create engaging social apps. Requirements for Apps store connect, people may receive, and process certain contact, location, identifier, and device information associated with Facebook users and their use of the application in order to provide functionality within Facebook IOS SDK. The information received is determined by the SDK features that third-party application use. (Meta for Developers 2022.)

4.7.3 Facebook SDK for JavaScript

The Facebook SDK for JavaScript includes a wide range of client-side functionality. It is including allows people to incorporate the Like Button and other Social Plugins into the website and allows people

to use Facebook Login to make it easier to sign up for the websites. It also makes it simple to use Facebook's Graph API, launch dialogs that allow people to do things like share stories, facilitates communication when creating a Facebook game or app tab. (Meta for Developers 2022.)

The Facebook SDK for JavaScript does not require any separate files to be downloaded or installed; instead, people must include a short piece of regular JavaScript in HTML to asynchronously load the SDK into the pages. Because it is async, it does not interfere with the loading of other elements on the page. The code below will generate a basic version of the SDK with the options set to their most common defaults. On each page where people want it to appear, place it directly after the opening `<body>` tag: (Meta for Developers 2022.)

```
<script>

  window.fbAsyncInit = function() {

    FB.init({

      appId          : 'your-app-id',

      autoLogAppEvents : true,

      xfbml          : true,

      version        : 'v14.0'

    });

  };

</script>

<script async defer crossorigin="anonymous"
src="https://connect.facebook.net/en_US/sdk.js"></script>
```

CODE 14: Facebook SDK scripts

4.7.4 Facebook SDK for PHP

The Facebook SDK for PHP is a powerful library that allows PHP developers to easily integrate Facebook login and Graph API requests. It also works well with the Facebook SDK for JavaScript to provide the best possible user experience to the front-end user. However, the Facebook SDK for PHP allows people to easily upload photos and videos as well as send batch requests to the Graph API, among other things. Furthermore, the SDK for PHP has numerous extensibility points, giving PHP developers complete control over how the SDK for PHP interacts with their specific hosting environment and web framework. (GitHub facebookarchive/php-graph-sdk 2017.)

The examples below show how to use the Facebook SDK for PHP to complete common tasks. First is Authentication & Signed Requests. Facebook Login (OAuth 2.0), obtaining an access token from the SDK for JavaScript, obtaining an access token within a Facebook Canvas context (or Facebook Page tab context). Second is retrieve a user's profile, post a link to a user's feed. Next is upload a photo to a user's profile, upload a video to a user's profile. Or batch requests are sending requests in a batch, uploading files in a batch. Finally, is pagination is basic pagination. (GitHub facebookarchive/php-graph-sdk 2017.)

4.7.5 Facebook SDK for tvOS

The Apple TV brings the App Store to the big screen in living room. People can create fantastic social experiences on Apple TV using the Facebook SDK for tvOS. They can integrate the following features into their tvOS app using the Facebook SDK for tvOS. Facebook Login allows people to log into tvOS app quickly and easily, allowing to provide rich, personalized experiences. Instead of using the TV remote to enter credentials, people can simply enter a confirmation code on their smartphone or computer. Share to Facebook helps people share links, photos, and videos from tvOS app with their Facebook friends to help grow the app and provide social experiences. (Meta for Developers 2022.)

4.7.6 Unity SDK

The Unity engine and ecosystem provide developers with a world-class technology platform from which they can quickly and effectively create games that work seamlessly across multiple platforms. The Facebook SDK for Unity extends Unity Technologies' cross-platform support by delivering a pure-Unity write-once, run-everywhere experience across WebGL, Unity Web Player, Android, and

iOS. People will be able to deploy socially integrated gaming experiences to their players regardless of platform by using a single codebase. (Meta for Developers 2022.)

The Facebook SDK for Unity includes a comprehensive collection of Facebook's social features, allowing players of developers' Unity game to share content with their friends and creating a personal, social gaming experience. The SDK not only provides a base set of features that are invoked consistently across platforms, but it also supports Facebook features that are unique to a specific platform (e.g., payments on the Web or App Invites on mobile). This will allow people to keep their code clean by employing a simple, consistent model for everything their Facebook game can do. (Meta for Developers 2022.)

4.7.7 Facebook business SDK

The Facebook Business SDK provides people with access to their suite of business APIs, allowing to create unique and customized solutions for customers and businesses. Many businesses rely on multiple Facebook APIs to meet their requirements. Adopting and maintaining all these APIs across multiple platforms can be time consuming and inefficient. As a result, Facebook created the Business SDK, which combines business-focused APIs into a single SDK to simplify implementation and maintenance. (Meta for Developers 2022.)

Facebook business SDK components: Business Manager API, Pages API, Marketing API, Instagram Graph API. Common uses of Facebook business API are Ads buying. It creates ad campaigns for Click to Messenger Ads and promote Facebook Page with this guide. Instagram Management is guide for publishing photos and responding to comments on Instagram. Onboarding Clients at Scale is guide for managing hundreds or thousands of small businesses and offering them ads buying within website or platform. Page Management is guided to creating pages, updating pages, and managing Page content. (Meta for Developers 2022.)

5 CONCLUSION

Four chapters of the topic have demonstrated the objectives established when implementing the topic. Specifically, the second chapter systematized general API knowledge. This chapter also demonstrated how the API works, the components involved in using the API, and the various types of APIs, discover REST APIs. The third chapter introduces to the GRAPH API, specifically the Facebook Graph API, how it works, and how to use it. The fourth chapter learns the fundamentals of sending and receiving data from the Facebook Social Graph, as well as how to implement the APIs, Platforms, Products, and SDKs to meet the needs of the application.

There are some issues concerning the right to use user information that cannot be fully addressed in this topic. The application only goes so far as to explain how to use the Facebook API and what it can be used for. Since March 2018, Facebook's API policy for app developers has changed significantly. The topic has not been able to clarify all the possibilities available in the Facebook API. The resolution of these flaws is also the topic's future development direction.

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