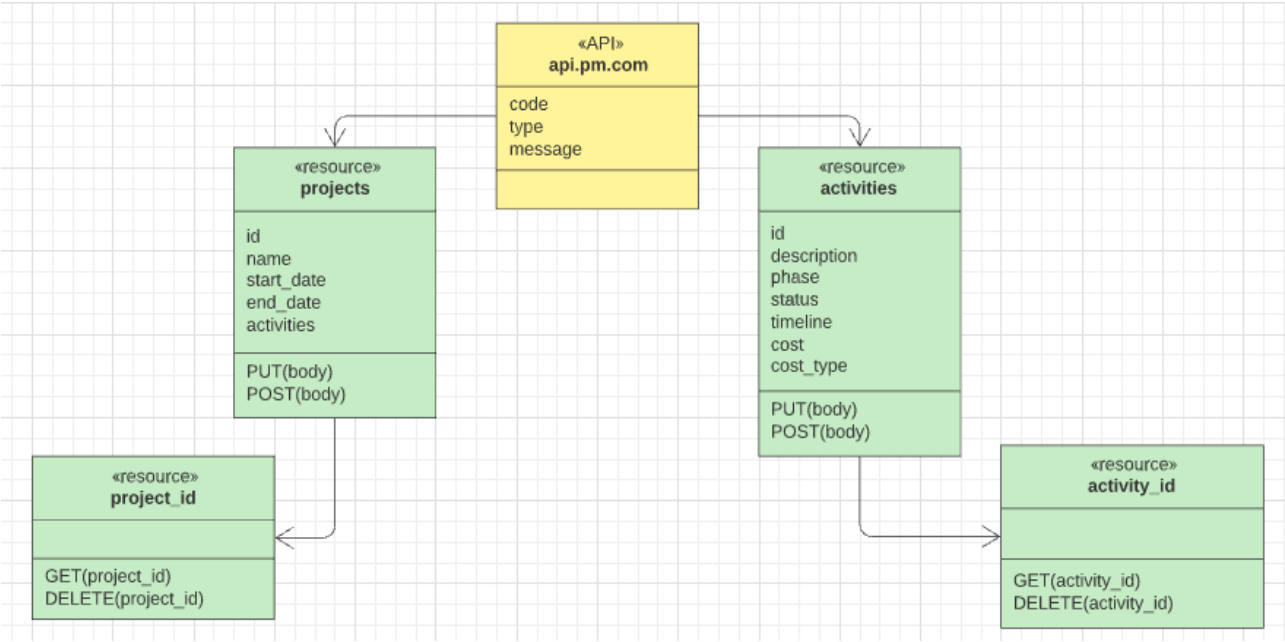
Project Design and Outline

Figure 1

Project Management API



Note. The diagram models a Python API. The API can support a management board in which project activities are grouped by phases (Initiation, Planning, Execution, Launch, and Closure).

Scope

The project will encompass a project management API built with Python that interfaces with a blockchain API which stores data on a private business ledger. The separation of concerns allows the API to address the problem of project management and allocates the responsibility of blockchain to an enterprise blockchain as a service

solution. The solution will be employed for creating and hosting a blockchain business network.

The API is a RESTful API using JSON on the HTTP protocol and consists of three resource archetypes: docroot, resource, and collection. The docroot or entry point will be https://api.pm.com. A resource can be viewed as an object instance that can include field values and resource links. Individual resources like project or activity can be accessed by their ID, for instance, *activities/1*. A project resource contains an ID, name, start date and end date, and a resource link, activities. An activity resource maintains an ID, description, phase, status, timeline, cost, and cost type. Resources are the base archetype for collections. A collection is a server-managed directory of resources, e.g. https://api.pm.com/projects/1/activities. Lastly, every response generated from accessing a resource will be passed as a parameter to a blockchain API.

Blockchain will aid in producing an immutable record of project management events using distributed ledger technology (Norris, 2019). The IBM Blockchain Platform gives engineers the ability to make a Hyperledger Fabric network and deploy it on an IBM Kubernetes service, in addition to creating smart contracts on the network (Cuomo et al., 2018). Hyperledger Fabric is a ledger that maintains both the current value of all objects or world state on the ledger and a blockchain that documents all transactions that produced the present state (Hyperledger, 2020). A smart contract is code running on a blockchain that allows engineers to designate business processes and data shared on a blockchain business network. In the permissioned network, the team using the project management API and the client benefiting from the corresponding project will

share accurate data thereby establishing greater trust. The IBM Blockchain Platform extension will be utilized in creating smart contracts and connecting to Hyperledger Fabric environments (Microsoft, n.d.).

Once a smart contract is constructed and deployed to a private business network, the contract can be retrieved from the network and stored as a variable (see Figure 2). Then throughout an application, after a project management API call, the API response can be passed as a value to submit a transaction. This call will send the response to the ledger to record the project event.

Figure 2

Chaincode

```
const network = await gateway.getNetwork(`company`);

const contract = await network.getContract('pmcontract', 'org.company.commercial');

const issueResponse = await contract.submitTransaction('issue', 'Company', response);
```

Estimates and Changes

The API may be modified to include new attributes and additional resources. Moreover, stakeholders may request a change in where the network is hosted. The project will use an IBM cloud service, but the network can live on AWS or Microsoft Azure or another cloud vendor. Fortunately, IBM's blockchain platform can run in any infrastructure. As for timeline, we are estimating one sprint for inception, eight sprints for delivery, and two sprints for maintenance.

References

Cuomo, J., Cocco, S., & Singh, G. (2018, March 18). *Develop, govern, and operate your business network with the IBM Blockchain Platform*. IBM. https://developer.ibm.com/tutorials/cl-ibm-blockchain-platform-develop-govern-operate-your-business-network/

Hyperledger. (2020). *A Blockchain Platform for the Enterprise*. Hyperledger Fabric. https://hyperledger-fabric.readthedocs.io/en/release-2.1/index.html

Microsoft. (n.d.) *IBM Blockchain Platform Extension for VS Code*. Microsoft. https://marketplace.visualstudio.com/items?itemName=IBMBlockchain.ibm-blockchain-platform

Microsoft REST API Guidelines Working Group. (2016, July 19). *Microsoft REST API Guidelines*. GitHub. https://github.com/microsoft/api-guidelines/blob/vNext/Guidelines.md

Norris, T. (2019, June 5). *Using blockchain as a project management device*. IBM. https://www.ibm.com/blogs/blockchain/2019/06/using-blockchain-as-a-project-management-device/