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# PREDICTION REST API DOCUMENT

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Cognitive Assistant for Networks (CAN) Release 6.0



FEBRUARY 28, 2023

AVANSEUS TECHNOLOGIES PVT. LTD.

## REVISION HISTORY

| Version | Date           | Change description | Created by | Updated by    | Reviewed by |
|---------|----------------|--------------------|------------|---------------|-------------|
| V5.5    | August, 2021   | Initial Release    | Hemanth    | Sandeep Singh | Chiranjib   |
| V6.0    | February, 2023 | Updates            | Manoj      | Raksha        | Chiranjib   |

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## Background

The overall idea of this architecture is to decompose the CAN prediction module. It ensures that the load distribution can happen at lowest (individual sequence) level that helps CAN prediction module to overcome the current limitation of cause based division. This architecture also enables each micro-service to scale horizontally and thereby, increase the capacity as required. These smaller micro-services focus on a set of loosely coupled actions on a well-defined dataset and provide a clean way to expose prediction functionality towards the external consumer applications.

For this purpose, CAN prediction is decomposed into three components, namely:

1. **Consumer:** Responsible for the generation of prediction input.
2. **Controller:** Responsible for collecting the prediction input and calling the worker service in batch mode.
3. **Worker:** Responsible for performing atomic prediction.

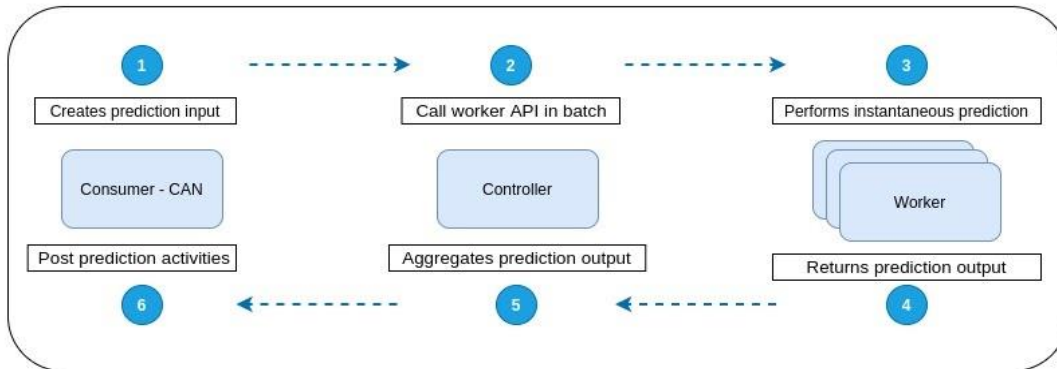


Figure 1 - Overview of Prediction flow with micro-services

This decomposed architecture allows each of the above components to perform its tasks independently and allows components to remain completely autonomous and unaware of each other.

## Prediction Controller

### Prediction Controller REST API Template

```

{
  "swagger": "2.0",
  "info": {
    "description": "Avanseus CAN Controller application is responsible for performing batch prediction by interacting with CAN worker application.",
    "version": "0.0.1-SNAPSHOT",
    "title": "Avanseus Prediction Controller",
    "contact": {
      "name": "Avanseus Technologies pvt ltd",
      "url": "http://www.avanseus.com",
      "email": "support@avanseus.com"
    }
  },
  "license": {
    "name": "Avanseus Software License Agreement",
    "url": "http://www.avanseus.com/legal/"
  }
},
{
  "host": "allbackend",
  "basePath": "/PredictionController",
  "tags": [
    {
      "name": "PredictionController",
      "description": "REST API for running batch prediction"
    }
  ]
}
  
```

```

],
"paths": {
  "/alarm/predict": {
    "post": {
      "tags": [
        "PredictionController"
      ],
      "summary": "API to run batch Alarm prediction",
      "operationId": "processAlarmInputFileUsingPOST",
      "consumes": [
        "multipart/form-data"
      ],
      "produces": [
        "*"
      ],
      "parameters": [
        {
          "name": "inputFile",
          "in": "formData",
          "description": "inputFile",
          "required": true,
          "type": "file"
        },
        {
          "name": "predictionInterval",
          "in": "query",
          "required": true,
          "type": "integer",
          "format": "int32"
        },
        {
          "name": "advancePrediction",
          "in": "query",
          "required": true,
          "type": "boolean"
        },
        {
          "name": "skipDays",
          "in": "query",
          "required": true,
          "type": "integer",
          "format": "int32"
        }
      ],
      "responses": {
        "200": {
          "description": "The request got processed successfully.",
          "schema": {
            "type": "string"
          }
        },
        "400": {
          "description": "Bad request. Please check the parameters."
        },
        "403": {
          "description": "Accessing the resource you were trying to reach is forbidden."
        },
        "404": {

```

```

    "description": "The server has not found anything matching the Request-URI."
  },
  "500": {
    "description": "Internal server error. Please contact admin."
  }
},
"/kpi/predict": {
  "post": {
    "tags": [
      "PredictionController"
    ],
    "summary": "API to run batch KPI prediction",
    "operationId": "processKpiInputFileUsingPOST",
    "consumes": [
      "multipart/form-data"
    ],
    "produces": [
      "*"
    ],
    "parameters": [
      {
        "name": "inputFile",
        "in": "formData",
        "description": "inputFile",
        "required": true,
        "type": "file"
      },
      {
        "name": "predictionType",
        "in": "query",
        "required": true,
        "type": "string",
        "enum": [
          "ALARM",
          "KPI",
          "SUPERPOSED",
          "TICKET"
        ]
      },
      {
        "name": "predictionInterval",
        "in": "query",
        "required": true,
        "type": "integer",
        "format": "int32"
      }
    ],
    "responses": {
      "200": {
        "description": "The request got processed successfully.",
        "schema": {
          "type": "string"
        }
      },
      "400": {
        "description": "Bad request. Please check the parameters."
      }
    }
  }
}

```

```

    },
    "403": {
      "description": "Accessing the resource you were trying to reach is forbidden."
    },
    "404": {
      "description": "The server has not found anything matching the Request-URI."
    },
    "500": {
      "description": "Internal server error. Please contact admin."
    }
  }
},
"/ticket/predict": {
  "post": {
    "tags": [
      "PredictionController"
    ],
    "summary": "API to run batch Ticket correlation prediction",
    "operationId": "processTicketCorrelationInputFileUsingPOST",
    "consumes": [
      "multipart/form-data"
    ],
    "produces": [
      "*"
    ],
    "parameters": [
      {
        "name": "inputFile",
        "in": "formData",
        "description": "inputFile",
        "required": true,
        "type": "file"
      },
      {
        "name": "predictionType",
        "in": "query",
        "required": true,
        "type": "string",
        "enum": [
          "ALARM",
          "KPI",
          "SUPERPOSED",
          "TICKET"
        ]
      },
      {
        "name": "predictionInterval",
        "in": "query",
        "required": true,
        "type": "integer",
        "format": "int32"
      },
      {
        "name": "skipDays",
        "in": "query",
        "required": true,
        "type": "integer",

```

```

    "format": "int32"
  }
],
"responses": {
  "200": {
    "description": "The request got processed successfully.",
    "schema": {
      "type": "string"
    }
  },
  "400": {
    "description": "Bad request. Please check the parameters."
  },
  "403": {
    "description": "Accessing the resource you were trying to reach is forbidden."
  },
  "404": {
    "description": "The server has not found anything matching the Request-URI."
  },
  "500": {
    "description": "Internal server error. Please contact admin."
  }
}
},
"definitions": {
  "InputStream": {
    "type": "object"
  },
  "Resource": {
    "type": "object",
    "properties": {
      "description": {
        "type": "string"
      },
      "file": {
        "type": "file"
      },
      "filename": {
        "type": "string"
      },
      "inputStream": {
        "$ref": "#/definitions/InputStream"
      },
      "open": {
        "type": "boolean"
      },
      "readable": {
        "type": "boolean"
      },
      "uri": {
        "$ref": "#/definitions/URI"
      },
      "url": {
        "$ref": "#/definitions/URL"
      }
    }
  }
}

```

```

},
"File": {
  "type": "object",
  "properties": {
    "absolute": {
      "type": "boolean"
    },
    "absoluteFile": {
      "type": "file"
    },
    "absolutePath": {
      "type": "string"
    },
    "canonicalFile": {
      "type": "file"
    },
    "canonicalPath": {
      "type": "string"
    },
    "directory": {
      "type": "boolean"
    },
    "file": {
      "type": "boolean"
    },
    "freeSpace": {
      "type": "integer",
      "format": "int64"
    },
    "hidden": {
      "type": "boolean"
    },
    "name": {
      "type": "string"
    },
    "parent": {
      "type": "string"
    },
    "parentFile": {
      "type": "file"
    },
    "path": {
      "type": "string"
    },
    "totalSpace": {
      "type": "integer",
      "format": "int64"
    },
    "usableSpace": {
      "type": "integer",
      "format": "int64"
    }
  }
},
"URI": {
  "type": "object",
  "properties": {
    "absolute": {

```

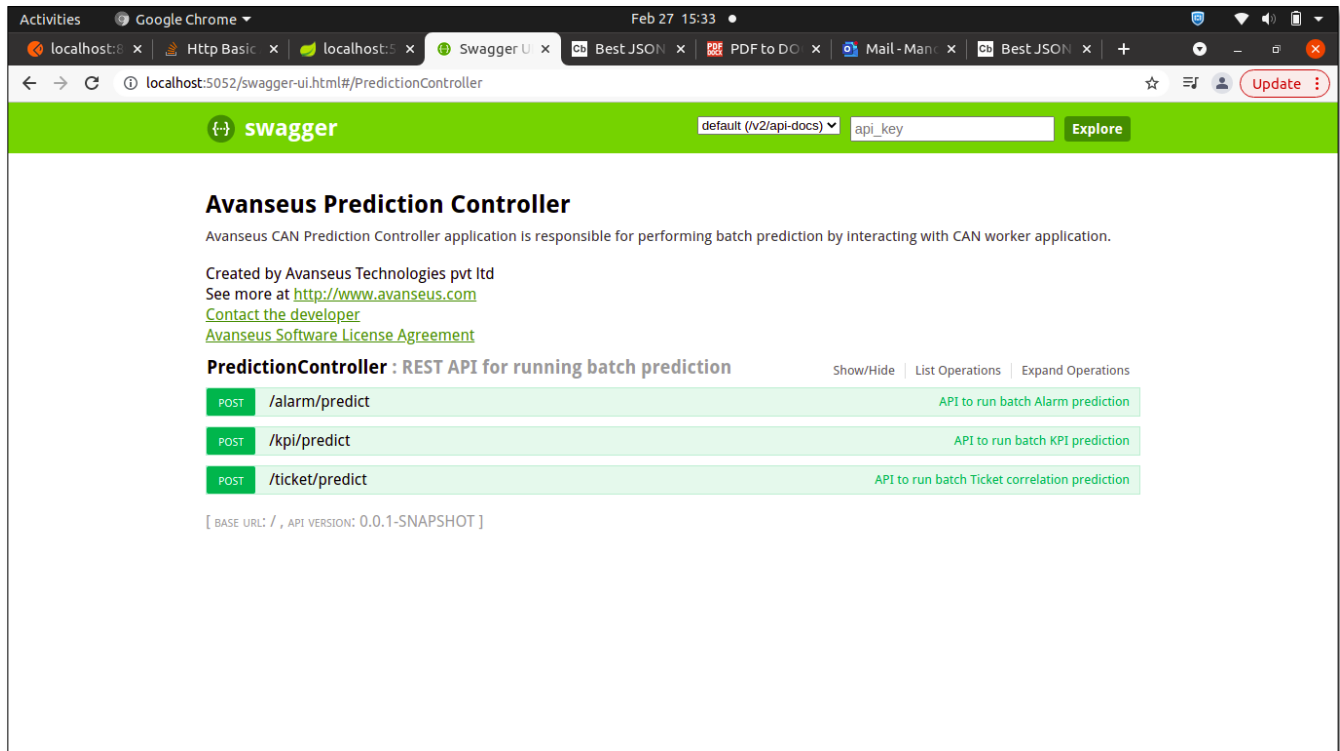
```

    "type": "boolean"
  },
  "authority": {
    "type": "string"
  },
  "fragment": {
    "type": "string"
  },
  "host": {
    "type": "string"
  },
  "opaque": {
    "type": "boolean"
  },
  "path": {
    "type": "string"
  },
  "port": {
    "type": "integer",
    "format": "int32"
  },
  "query": {
    "type": "string"
  },
  "rawAuthority": {
    "type": "string"
  },
  "rawFragment": {
    "type": "string"
  },
  "rawPath": {
    "type": "string"
  },
  "rawQuery": {
    "type": "string"
  },
  "rawSchemeSpecificPart": {
    "type": "string"
  },
  "rawUserInfo": {
    "type": "string"
  },
  "scheme": {
    "type": "string"
  },
  "schemeSpecificPart": {
    "type": "string"
  },
  "userInfo": {
    "type": "string"
  }
}
},
"URL": {
  "type": "object",
  "properties": {
    "authority": {
      "type": "string"
    }
  }
}

```



## Prediction Controller Testing from Swagger UI



Activities Google Chrome Feb 27 15:33

localhost:5052/swagger-ui.html#/PredictionController

swagger default (v2/api-docs) api\_key Explore

### Avanseus Prediction Controller

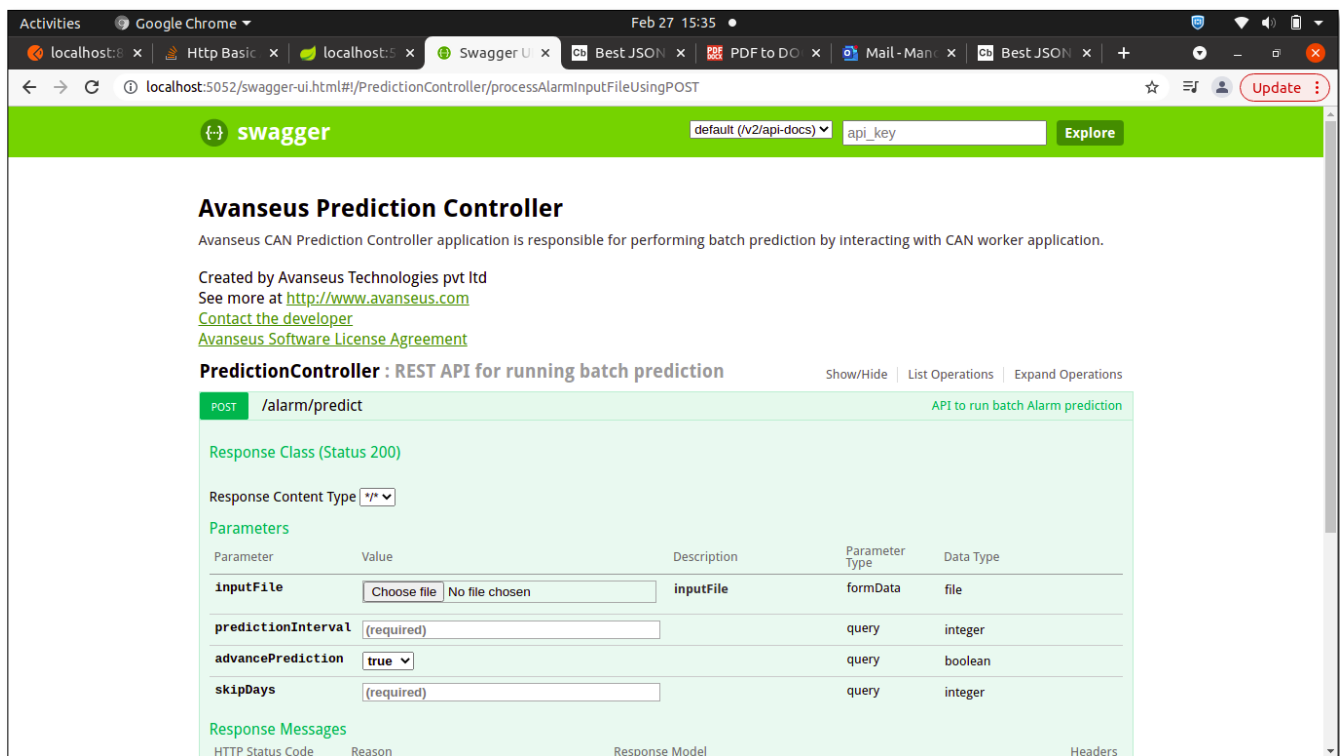
Avanseus CAN Prediction Controller application is responsible for performing batch prediction by interacting with CAN worker application.

Created by Avanseus Technologies pvt ltd  
See more at <http://www.avanseus.com>  
[Contact the developer](#)  
[Avanseus Software License Agreement](#)

**PredictionController : REST API for running batch prediction** Show/Hide List Operations Expand Operations

- POST /alarm/predict API to run batch Alarm prediction
- POST /kpi/predict API to run batch KPI prediction
- POST /ticket/predict API to run batch Ticket correlation prediction

[ BASE URL: / , API VERSION: 0.0.1-SNAPSHOT ]



Activities Google Chrome Feb 27 15:35

localhost:5052/swagger-ui.html#/PredictionController/processAlarmInputFileUsingPOST

swagger default (v2/api-docs) api\_key Explore

### Avanseus Prediction Controller

Avanseus CAN Prediction Controller application is responsible for performing batch prediction by interacting with CAN worker application.

Created by Avanseus Technologies pvt ltd  
See more at <http://www.avanseus.com>  
[Contact the developer](#)  
[Avanseus Software License Agreement](#)

**PredictionController : REST API for running batch prediction** Show/Hide List Operations Expand Operations

POST /alarm/predict API to run batch Alarm prediction

Response Class (Status 200)

Response Content Type

Parameters

| Parameter          | Value                                                     | Description | Parameter Type | Data Type |
|--------------------|-----------------------------------------------------------|-------------|----------------|-----------|
| inputFile          | <input type="button" value="Choose file"/> No file chosen | inputFile   | formData       | file      |
| predictionInterval | <input type="text" value="(required)"/>                   |             | query          | integer   |
| advancePrediction  | <input checked="" type="checkbox" value="true"/>          |             | query          | boolean   |
| skipDays           | <input type="text" value="(required)"/>                   |             | query          | integer   |

Response Messages

| HTTP Status Code | Reason | Response Model | Headers |
|------------------|--------|----------------|---------|
|------------------|--------|----------------|---------|

## Prediction Worker

## Prediction Worker REST API Template

```
{
  "swagger": "2.0",
  "info": {
    "description": "Avanseus Worker application is responsible for performing instantaneous prediction.",
    "version": "0.0.1-SNAPSHOT",
    "title": "Avanseus Prediction Worker",
    "contact": {
      "name": "Avanseus Technologies Pvt. Ltd.",
      "url": "http://www.avanseus.com",
      "email": "support@avanseus.com"
    },
    "license": {
      "name": "Avanseus Software License Agreement",
      "url": "http://www.avanseus.com/legal/"
    }
  },
  "host": "allbackend",
  "basePath": "/PredictionWorker",
  "tags": [
    {
      "name": "PredictionWorker",
      "description": "REST API for running instantaneous prediction"
    }
  ],
  "paths": {
    "/alarm": {
      "post": {
        "tags": [
          "PredictionWorker"
        ],
        "summary": "API to run instantaneous Alarm prediction",
        "operationId": "runPredictionForGivenLineUsingPOST",
        "consumes": [
          "application/json"
        ],
        "produces": [
          "*"
        ],
        "parameters": [
          {
            "in": "body",
            "name": "alarmPredictionInputParam",
            "description": "alarmPredictionInputParam",
            "required": true,
            "schema": {
              "$ref": "#/definitions/PredictionInputParam"
            }
          }
        ],
        "responses": {
          "200": {
            "description": "The request got processed successfully.",
            "schema": {
              "type": "string"
            }
          }
        }
      }
    }
  }
}
```

```

"400": {
  "description": "Bad request. Please check the parameters."
},
"403": {
  "description": "Accessing the resource you were trying to reach is forbidden."
},
"404": {
  "description": "The server has not found anything matching the Request-URI."
},
"500": {
  "description": "Internal server error. Please contact admin."
}
}
},
"/kpi": {
  "post": {
    "tags": [
      "PredictionWorker"
    ],
    "summary": "API to run instantaneous KPI prediction",
    "operationId": "runPredictionForGivenKpiLineUsingPOST",
    "consumes": [
      "application/json"
    ],
    "produces": [
      "*"/*"
    ],
    "parameters": [
      {
        "in": "body",
        "name": "kpiPredictionInputParam",
        "description": "kpiPredictionInputParam",
        "required": true,
        "schema": {
          "$ref": "#/definitions/PredictionInputParam"
        }
      }
    ],
    "responses": {
      "200": {
        "description": "The request got processed successfully.",
        "schema": {
          "type": "string"
        }
      },
      "400": {
        "description": "Bad request. Please check the parameters."
      },
      "403": {
        "description": "Accessing the resource you were trying to reach is forbidden."
      },
      "404": {
        "description": "The server has not found anything matching the Request-URI."
      },
      "500": {
        "description": "Internal server error. Please contact admin."
      }
    }
  }
}

```

```

    }
  }
},
"/ticket": {
  "post": {
    "tags": [
      "PredictionWorker"
    ],
    "summary": "API to run instantaneous ticket correlation prediction",
    "operationId": "runPredictionForGivenTicketCorrelationLineUsingPOST",
    "consumes": [
      "application/json"
    ],
    "produces": [
      "*"
    ],
    "parameters": [
      {
        "in": "body",
        "name": "ticketCorrelationPredictionInputParam",
        "description": "ticketCorrelationPredictionInputParam",
        "required": true,
        "schema": {
          "$ref": "#/definitions/PredictionInputParam"
        }
      }
    ],
    "responses": {
      "200": {
        "description": "The request got processed successfully.",
        "schema": {
          "type": "string"
        }
      },
      "400": {
        "description": "Bad request. Please check the parameters."
      },
      "403": {
        "description": "Accessing the resource you were trying to reach is forbidden."
      },
      "404": {
        "description": "The server has not found anything matching the Request-URI."
      },
      "500": {
        "description": "Internal server error. Please contact admin."
      }
    }
  }
},
"/superposed": {
  "post": {
    "tags": [
      "PredictionWorker"
    ],
    "summary": "API to run instantaneous KPI prediction",
    "operationId": "runPredictionForGivenKpiLineUsingPOST",
    "consumes": [
      "application/json"
    ]
  }
}

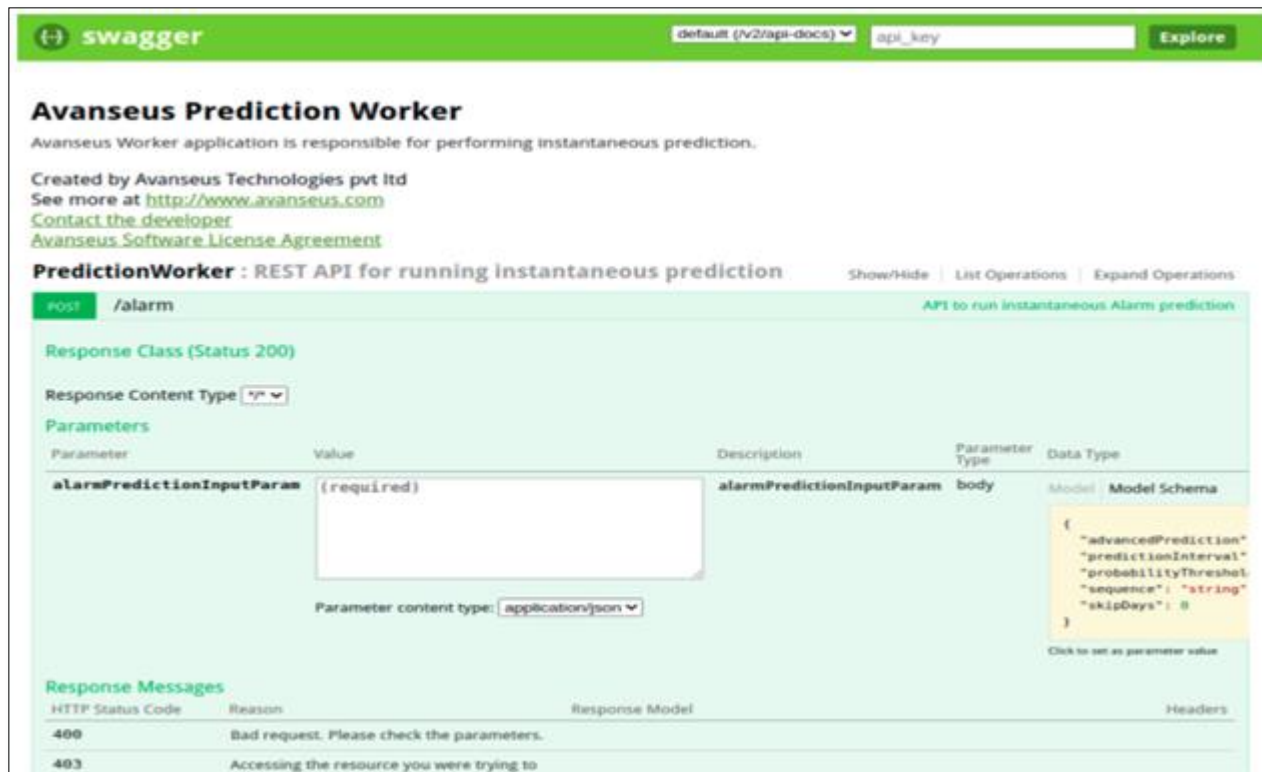
```

```

],
"produces": [
  "*"/*
],
"parameters": [
  {
    "in": "body",
    "name": "kpiPredictionInputParam",
    "description": "kpiPredictionInputParam",
    "required": true,
    "schema": {
      "$ref": "#/definitions/PredictionInputParam"
    }
  }
],
"responses": {
  "200": {
    "description": "The request got processed successfully.",
    "schema": {
      "type": "string"
    }
  },
  "400": {
    "description": "Bad request. Please check the parameters."
  },
  "403": {
    "description": "Accessing the resource you were trying to reach is forbidden."
  },
  "404": {
    "description": "The server has not found anything matching the Request-URI."
  },
  "500": {
    "description": "Internal server error. Please contact admin."
  }
}
},
"definitions": {
  "PredictionInputParam": {
    "type": "object",
    "required": [
      "predictionInterval",
      "probabilityThreshold",
      "sequence",
      "skipDays"
    ]
  },
  "properties": {
    "advancedPrediction": {
      "type": "boolean"
    },
    "predictionInterval": {
      "type": "integer",
      "format": "int32"
    },
    "probabilityThreshold": {
      "type": "number",
      "format": "double"
    }
  }
}

```





**Avanseus Prediction Worker**  
 Avanseus Worker application is responsible for performing instantaneous prediction.  
 Created by Avanseus Technologies pvt ltd  
 See more at <http://www.avanseus.com>  
[Contact the developer](#)  
[Avanseus Software License Agreement](#)

**PredictionWorker : REST API for running instantaneous prediction** Show/Hide | List Operations | Expand Operations

**POST** /alarm API to run instantaneous Alarm prediction

Response Class (Status 200)

Response Content Type:

Parameters

| Parameter                 | Value      | Description               | Parameter Type | Data Type |
|---------------------------|------------|---------------------------|----------------|-----------|
| alarmPredictionInputParam | (required) | alarmPredictionInputParam | body           | Model     |

Parameter content type:

Model Schema

```
{
  "advancedPrediction": true,
  "predictionInterval": 10,
  "probabilityThreshold": 0.5,
  "sequence": "string",
  "skipDays": 0
}
```

Click to set as parameter value

Response Messages

| HTTP Status Code | Reason                                    | Response Model | Headers |
|------------------|-------------------------------------------|----------------|---------|
| 400              | Bad request. Please check the parameters. |                |         |
| 403              | Accessing the resource you were trying to |                |         |

## Cluster Worker

### Cluster Worker REST API Template

```
{
  "swagger": "2.0",
  "info": {
    "description": "Avanseus Cluster Worker responsible for discovering clusters.",
    "version": "0.0.1-SNAPSHOT",
    "title": "Avanseus Cluster Worker",
    "contact": {
      "name": "Avanseus Technologies pvt ltd",
      "url": "http://www.avanseus.com",
      "email": "support@avanseus.com"
    },
    "license": {
      "name": "Avanseus Software License Agreement",
      "url": "http://www.avanseus.com/legal/"
    }
  },
  "host": "allbackend",
  "basePath": "/ClusterWorker",
  "tags": [
    {
      "name": "ClusterWorker",
      "description": "REST API to discover the clusters from the given vector list"
    }
  ],
  "paths": {
    "/topology": {
      "post": {
```

```

"tags": [
  "ClusterWorker"
],
"summary": "API to get clusters",
"operationId": "processClusterInputUsingPOST",
"consumes": [
  "multipart/form-data"
],
"produces": [
  "*"
],
"parameters": [
  {
    "name": "inputFile",
    "in": "formData",
    "description": "inputFile",
    "required": true,
    "type": "file"
  }
],
"responses": {
  "200": {
    "description": "The request got processed successfully.",
    "schema": {
      "type": "string"
    }
  },
  "400": {
    "description": "Bad request. Please check the parameters."
  },
  "403": {
    "description": "Accessing the resource you were trying to reach is forbidden."
  },
  "404": {
    "description": "The server has not found anything matching the Request-URI."
  },
  "500": {
    "description": "Internal server error. Please contact admin."
  }
}
},
"definitions": {
  "InputStream": {
    "type": "object"
  },
  "Resource": {
    "type": "object",
    "properties": {
      "description": {
        "type": "string"
      }
    }
  },
  "file": {
    "type": "file"
  },
  "filename": {
    "type": "string"
  }
}

```

```

},
"inputStream": {
  "$ref": "#/definitions/InputStream"
},
"open": {
  "type": "boolean"
},
"readable": {
  "type": "boolean"
},
"uri": {
  "$ref": "#/definitions/URI"
},
"url": {
  "$ref": "#/definitions/URL"
}
},
"File": {
  "type": "object",
  "properties": {
    "absolute": {
      "type": "boolean"
    },
    "absoluteFile": {
      "type": "file"
    },
    "absolutePath": {
      "type": "string"
    },
    "canonicalFile": {
      "type": "file"
    },
    "canonicalPath": {
      "type": "string"
    },
    "directory": {
      "type": "boolean"
    },
    "file": {
      "type": "boolean"
    },
    "freeSpace": {
      "type": "integer",
      "format": "int64"
    },
    "hidden": {
      "type": "boolean"
    },
    "name": {
      "type": "string"
    },
    "parent": {
      "type": "string"
    },
    "parentFile": {
      "type": "file"
    }
  }
},

```

```

    "path": {
      "type": "string"
    },
    "totalSpace": {
      "type": "integer",
      "format": "int64"
    },
    "usableSpace": {
      "type": "integer",
      "format": "int64"
    }
  },
  "URI": {
    "type": "object",
    "properties": {
      "absolute": {
        "type": "boolean"
      },
      "authority": {
        "type": "string"
      },
      "fragment": {
        "type": "string"
      },
      "host": {
        "type": "string"
      },
      "opaque": {
        "type": "boolean"
      },
      "path": {
        "type": "string"
      },
      "port": {
        "type": "integer",
        "format": "int32"
      },
      "query": {
        "type": "string"
      },
      "rawAuthority": {
        "type": "string"
      },
      "rawFragment": {
        "type": "string"
      },
      "rawPath": {
        "type": "string"
      },
      "rawQuery": {
        "type": "string"
      },
      "rawSchemeSpecificPart": {
        "type": "string"
      },
      "rawUserInfo": {
        "type": "string"
      }
    }
  }
}

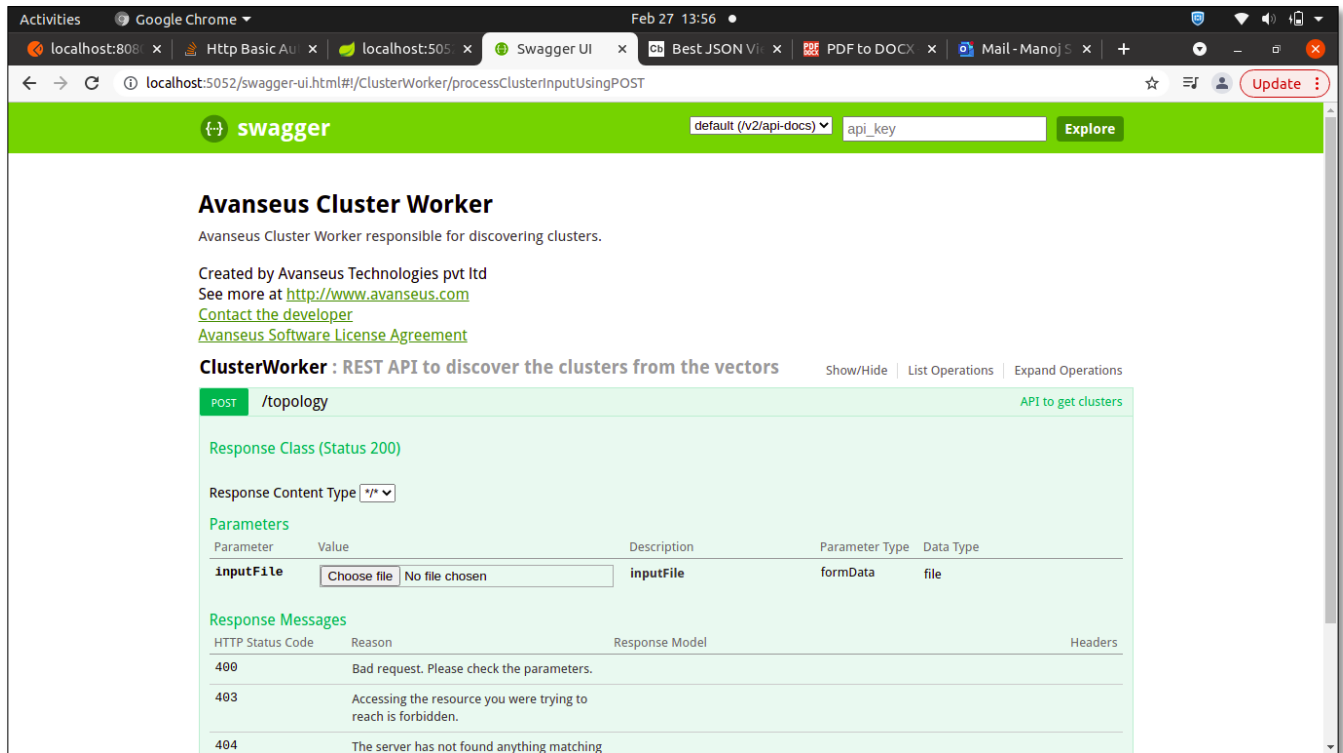
```

```

    },
    "scheme": {
      "type": "string"
    },
    "schemeSpecificPart": {
      "type": "string"
    },
    "userInfo": {
      "type": "string"
    }
  },
  "URL": {
    "type": "object",
    "properties": {
      "authority": {
        "type": "string"
      },
      "content": {
        "type": "object"
      },
      "defaultPort": {
        "type": "integer",
        "format": "int32"
      },
      "file": {
        "type": "string"
      },
      "host": {
        "type": "string"
      },
      "path": {
        "type": "string"
      },
      "port": {
        "type": "integer",
        "format": "int32"
      },
      "protocol": {
        "type": "string"
      },
      "query": {
        "type": "string"
      },
      "ref": {
        "type": "string"
      },
      "userInfo": {
        "type": "string"
      }
    }
  }
}

```

## Cluster Worker Testing from Swagger UI



The screenshot shows the Swagger UI for the Avanseus Cluster Worker API. The browser address bar indicates the URL is `localhost:5052/swagger-ui.html#/ClusterWorker/processClusterInputUsingPOST`. The Swagger UI header shows the API title "Avanseus Cluster Worker" and a description "Avanseus Cluster Worker responsible for discovering clusters." Below this, there are links for "Created by Avanseus Technologies pvt ltd", "See more at <http://www.avanseus.com>", "Contact the developer", and "Avanseus Software License Agreement".

The main section displays the "ClusterWorker : REST API to discover the clusters from the vectors" endpoint. The method is "POST" and the path is "/topology". The response class is "Response Class (Status 200)". The response content type is set to "application/json".

Parameters:

| Parameter | Value                                                   | Description | Parameter Type | Data Type |
|-----------|---------------------------------------------------------|-------------|----------------|-----------|
| inputFile | <input type="text" value="Choose file"/> No file chosen | inputFile   | formData       | file      |

Response Messages:

| HTTP Status Code | Reason                                                        | Response Model | Headers |
|------------------|---------------------------------------------------------------|----------------|---------|
| 400              | Bad request. Please check the parameters.                     |                |         |
| 403              | Accessing the resource you were trying to reach is forbidden. |                |         |
| 404              | The server has not found anything matching                    |                |         |