

## Implementation of FHIR SATUSEHAT API in Hospital Information System Applications

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### Abstract

Healthcare facilities (fasyankes) provide various healthcare services to the public, such as inpatient care, outpatient care, emergency care, and others, which are largely dominated by hospitals. Healthcare activities are closely associated with patient data, which serves as a reference for patient treatment. In fasyankes term, this is commonly known as medical records; however, according to Indonesian Ministry regulations, appropriate recording is done in the form of electronic medical records. Therefore, a system is needed to handle this recording, and one of these systems is the Hospital Management Information System (SIMRS). In recording electronic medical records, various fasyankes across Indonesia differ in how they record and store these records. As a result, the Ministry of Health introduced the SATUSEHAT platform as a standard for medical record keeping. The core idea behind the SATUSEHAT platform is that healthcare facilities are primarily obligated to record medical records within the SATUSEHAT health system platform launched by the Indonesian Ministry of Health. However, a question arises: "Can this SATUSEHAT platform be implemented in hospital applications across Indonesia?" To address this question, the author makes use of the Agile Scrum method to attempt the integration of fasyankes' medical records, mainly those of hospitals, with the SATUSEHAT platform. Furthermore, the use of the SATUSEHAT platform in this research is within its development stage, subject to constant changes, making the Agile Scrum method a suitable approach. The conclusion drawn by the author from this study is that the implementation of the SATUSEHAT platform is possible, even though some features may not be fully usable.

### Keywords

Agile Scrum, SATUSEHAT Platform, Electronic Medical Records, Hospital Management Information System (SIMRS)

### Introduction

Healthcare service facilities (healthcare facilities) commonly encountered in urban communities include hospitals that provide various health services such as inpatient care, outpatient care, emergency care, and other facilities (Rumah Sakit Dr. Tadjuddin Chalid Makassar, 2014). Health service activities are closely tied to patient data, which serves as a reference for patient management. Patient data in medical contexts is referred to as medical records, which

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include records and documents about patient identities, examinations, treatments, procedures, and other services provided to patients (Kementerian Kesehatan Republik Indonesia, 2008), making medical records essential in the healthcare field. However, the recording of medical records in each healthcare facility must be done electronically, as mandated by the Indonesian Ministry of Health Regulation No. 24 of 2022 regarding Medical Records (Kementerian Kesehatan Republik Indonesia, 2022). Therefore, a system is needed to manage electronic medical records, one of which is the Hospital Management Information System (SIMRS), specifically designed to assist in healthcare management and program planning (Kristanti & Ain, 2021).

The Hospital Management Information System (SIMRS) is a crucial tool in supporting hospital operational activities (Rusdiyanti, Ruliani & Herliani, 2022). According to Regulation No. 82 of 2013 from the Ministry of Health, the architecture of SIMRS consists of at least primary service activities (front office), administrative activities (back office), and collaborative communication [6]. Primary services encompass integrated procedures from registration to providing healthcare services to patients until their discharge. Meanwhile, administrative services involve managing physical resources such as human resources, finances, medical equipment, and others, including planning, procurement, maintenance, and management (Kementerian Kesehatan Republik Indonesia, 2013).

The transformation of medical record keeping in healthcare facilities must be implemented as soon as possible to achieve an integrated healthcare system. One approach is integrating patient medical record data from various healthcare facilities into a single platform called Indonesia Health Services (IHS), with the platform named SATUSEHAT officially launched by the Minister of Health, Budi Gunadi Sadikin (Rokom, 2022). The reason for creating the SATUSEHAT platform is that there are more than 400 Indonesian government-owned health applications that are not integrated and multiple instances of the same medical record data collected by different health applications (Pusdatin, 2023).

The SATUSEHAT platform is based on Representational State Transfer Application Programming Interface (ReST API) and the Health Level Seven International - Fast Healthcare Interoperability Resources (HL7 FHIR) data exchange mechanism (Pusdatin, 2023)<sup>2</sup>, adhering to international healthcare data exchange standards. Representational State Transfer (REST) is a software architecture used for distributing web service systems, and REST API is an application that communicates with web services using HTTP commands such as GET, PUT, POST, and DELETE to manipulate data. HL7 provides a comprehensive framework and standards for exchanging, integrating, sharing, and retrieving electronic health information that supports clinical practices, management, delivery, and evaluation of healthcare services. Additional tools include Postman for accessing the SATUSEHAT API and VSCode for programming changes. Postman is essential for testing, documenting, and identifying issues in APIs for both users and developers due to its benefits, while VSCode is a code editor that aids in application development.

The implementation of the SATUSEHAT platform in this study follows the Agile Scrum methodology. Agile methodologies are known for their flexibility in responding to changes, combining flexibility and stability (Sugiyono, 2017). With this approach, application development is broken down into small phases, resulting in adaptive planning and early delivery of changes

(Highsmith, 2002). This methodology aims to enhance speed and flexibility in software development and strengthen collaboration between developers and clients.

## Methodology

### Agile Methodology

Agile methodology is a development approach in which the process is iterative, focusing on rapid development, gradual application delivery, cost reduction, producing quality code, enabling changes to the application at any time, and involving customers or consumers directly in the application development process (Sommerville, 2003). Because of this, Agile methodology is characterized as adaptive and responsive in application development, just as the term "agile" implies - swift (Syaiful, 2015). As a concept, Agile methodology has several types, including Scrum, XP, Kanban, Agile Modeling, and others.

The author and the development team chose the Agile Scrum method because it is flexible in handling changes in needs or requests. In addition, the application to be developed has already been created and used in various projects, so the author and the development team cannot rebuild an existing application within the specified timeframe. The author is one of the members of the development team, consisting of several front-end and back-end programmers. The need for the development of the SATUSEHAT API comes from complaints from the field team and the marketing team regarding the implementation of electronic-based medical record regulations from the Indonesian Ministry of Health Regulation No. 24 of 2022 (Kementerian Kesehatan Republik Indonesia, 2022). These complaints were considered by the product owner, who was part of the management team at that time, leading to a request to the development team to implement the SATUSEHAT API into the existing application.

### Scrum Methodology

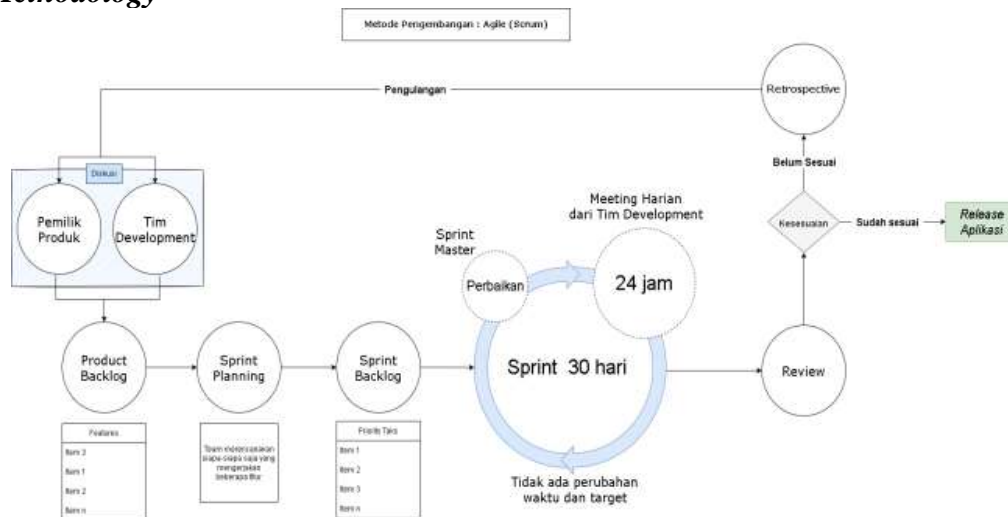


Figure 1. Scrum Methodology  
(Source: Hermanto, n.d)

In this study, the Scrum methodology will be used, albeit with some modifications to align with the company's work regulations. The Scrum method divides the development process into several sprints, which act as milestones in software creation. The stages within Scrum are as follows:

**A. *Discussion between the Development Team and Product Owner***

Discussion involves communication between the Development Team and the Product Owner (product user) to express application needs and suggestions. The purpose of this discussion is to address ongoing issues or concerns. Discussions may occur within each team, requiring representatives to express opinions. The results of the discussion in the system development include changes in the application flow, the availability of people for application development, the schedule and target completion time, and the costs incurred. Meanwhile, the discussions within the development team involve the allocation of personnel, tasks, and documentation regarding application changes.

**B. *Product Backlog***

The Product Backlog is a prioritized list of predefined system and product requests. It contains features translated from requests by the development team, which will be implemented into the system along with estimated completion times. The development team often refers to the SATUSEHAT API documentation, where they can extract several items that have been analyzed and considered crucial for implementing the SATUSEHAT API into the application. During the analysis and testing phase, the development team found that some of these items lacked completeness in data management, such as adding data, modifying data, searching for data, deleting data, and displaying data. The author has obtained approval from the head of the development team to select one example for further research, which is the API Location or ward. The API Location or ward is used to manage rooms within healthcare facilities (hospitals) and is nearly comprehensive in data management capabilities.

**C. *Sprint Planning***

Sprint Planning involves planning the sprint before it begins. This collaborative planning is performed by all members of the development team. Sprint planning can be seen as an analysis phase focused on solving specific problems. The duration of sprint planning varies based on the complexity and size of the problems to be solved. In this sprint, the author categorized several items from the product backlog into three phases: phase one with high priority, phase two with medium priority, and phase three with low priority.

**D. *Sprint Backlog***

The Sprint Backlog is a list of items from the Product Backlog identified by the development team. Development team only worked on the list that has been planned in sprint planning. At this stage all stakeholders can see what is being worked on. The sprint backlog will include items that have been prioritized into the three phases mentioned earlier:

1. Sprint Backlog Phase One (High Priority): The sprint backlog for phase one will contain tasks that need to be completed immediately and have high priority.
2. Sprint Backlog Phase Two (Medium Priority): The sprint backlog for phase two will encompass work with medium priority. These are tasks that are important but can be done after phase one is completed.
3. Sprint Backlog Phase Three (Low Priority): The sprint backlog for phase three will consist of tasks with low priority that may not need to be completed in this sprint but are still part of the long-term plan.

**E. *Review***

Review is reviewing the results of applications that have been carried out based on backlog items. This review aims to see a list of backlog items, which ones are done, pending and what items have been adjusted. The review is carried out at the end of each sprint with a maximum duration of four hours for one month. The result of the review is a product backlog that has been revised based on the needs of the product backlog items that will be implemented in the next sprint. In this review, the development team performs code testing to uncover errors or bugs and tests the functionality of the API to check if it functions as intended.

#### ***F. Retrospective***

Retrospective is an opportunity for the development team to inspect itself and make plans regarding improvements to be made in the next sprint. The result of the retrospective from the development team is a technical issue related to the use of the SATUSEHAT API, where there is one API that cannot be used or is not yet usable.

#### ***G. Review Outcome***

The results of the review are the results of the final application test that have been mutually agreed upon by the product owner and the application development team. At this stage, the product owner accepts the implementation of the SATUSEHAT API application with a note from the development team.

#### ***Research Support Tools***

To build the system, supporting equipment consisting of hardware and software is needed. The equipment used in this study includes:

1. A laptop with specifications of 4GB RAM, 500GB HDD, and Intel Core i5
2. Mouse and keyboard

#### ***Analysis Tool (POSTMAN API)***

The analysis and design tool used in building this software is Postman API, a tool for testing APIs. The SATUSEHAT platform also provides an example for accessing it using the Postman API.

## **Results and Discussion**

#### ***Discussion with Product Owner and Development Team***

In this study, the author obtained approval from the product owner and the development team, who agreed to implement the SATUSEHAT API. However, due to the limited size of the development team, each individual was required to manage their own projects. One project that could not be continued was the integration of the SIMRS application with the SATUSEHAT API. The SATUSEHAT platform has predefined rules for usage, prompting the author to leverage this opportunity for research. The development team, in implementing the SATUSEHAT API, planned to establish standardized coding rules for the API, which would be used in application development sourced from one module, namely the Location or ward module. The ward module was chosen for its simplicity, focusing only on basic tasks such as data creation, modification, retrieval, and deletion.

Considering the busy schedule of the development team members with their individual projects, several individuals were appointed as informants and testers for the SATUSEHAT API implementation. These informants had previously been equipped with an understanding of using the SATUSEHAT API. While comprehending the API, the informants raised some concerns, such as challenges in understanding implementation cases. During training, some implementations did not fully reflect the process of storing patient medical record data, including naming, format, description, and terminology usage. As a result, the informants struggled to envision how to implement these aspects into the application. The SATUSEHAT documentation was challenging to grasp due to its comprehensive content, requiring additional effort for understanding.

### ***Product Backlog***

The development team's plan to establish coding rules resulted in the generation of items related to data processing. The team aimed to determine the limitations of the core module to be tested. These limitations would serve as reference points for the development team in deciding the number of days needed for the SATUSEHAT API implementation in the SIMRS application. The following are some items used to implement the SATUSEHAT API:

Tabel 1. Product Backlog

ID	Backlog or Item	Priority	Estimated Time (days)	Notes
1	Limitations of other modules with the Location module	Medium	1	Checking other modules for equivalent feature completeness
2	Token creation as an identity for using the SATUSEHAT API	High	3	Automatic token generation upon usage
3	Registering a ward	Medium	1	Creating a ward with a name resembling real-world examples
4	Ward search	High	2	Searching for a ward based on name and availability
5	Modifying ward data	Medium	2	Modifying ward data if not in use
6	Deactivating a ward	Low	1	Deactivating an unused or unnecessary ward

Additional modules to be tested for limitations include core modules and one transaction module. Testing primarily focused on the challenges of implementing the SATUSEHAT API within the ongoing application. Core modules included Patient, Related Person, Practitioner, Practitioner Role, Organization, Encounter, Condition, Episode of Care, Imaging Study, and Service Request.

### ***Sprint Planning***

For sprint planning, the author categorized the list of tasks into three phases based on predetermined priorities. Based on the previous Product Backlog, the estimated time required was 10 days. The following table outlines the sprint phases:

Tabel 2. Sprint Planning

Phase	Priority	Estimated Time (days)
Phase 1	High	5
Phase 2	Medium	4
Phase 3	Low	1
Total Days		10

### ***Sprint Backlog and Results***

In this phase, the sprint was based on the outcomes of the product backlog. The sprint backlog covered phases 1 to 3:

### ***Phase 1 with High Priority***

#### **1. Token Creation as Identity for Using the SATUSEHAT API**

API SATUSEHAT Documentation requires users to utilize Tokens for each API request, aimed at data security and authentication. The following code snippet comprises several functions:

- Construct Function:** This function runs when a class is initially executed.
- getUrl Function:** This function returns the SATUSEHAT API address. It isn't declared as a global variable due to the potential to retrieve the link from a database, allowing for dynamic changes.
- createToken Function:** This function generates a token to serve as an identification when using SATUSEHAT API. It conceals the client\_id and client\_secret.

```
public $clientId;
public function __construct(Request $request) {
    /** check apakah header mempunyai client ID atau tidak */
    if(!$request->header('X-client')) {
        return response()->json(['success' => false, 'message' => 'terjadi error tidak memiliki.']);
    }
    $this->clientId = $request->header('X-client');
}

public function getUrl() {
    $baseUrl = 'https://api-satusehat-dev.dto.kemkes.go.id/fin-r4/v1';
    return $baseUrl;
}

public function createToken() {
    $response = Http::asForm()->post('https://api-satusehat-dev.dto.kemkes.go.id/oauth2/v1/accesstoken?grant_type=client_credentials', [
        'client_id' => '<ID DISKREKSI>',
        'client_secret' => '<SECRET ID DISKREKSI>',
    ]);
    $result = json_decode($response->getBody(), true);
    $value = $result['access_token'];
    return (string)$value;
}
```

Figure 2. Token Coding

```
{ "refresh_token_expires_in": "0", "api_product_list": ["api-dev"], "api_product_list_json": [ "api-dev" ],
"organization_name": "ihs-prod-1", "developer_email": "mlg.hafizh@gmail.com", "token_type":
"BearerToken", "issued_at": "1692243703888", "client_id":
"OWG5159qf0s5a2b0w0B0rQ-rg4g0K0B0r0a0e0f0a0e0a0e0", "access_token":
"OWG5159qf0s5a2b0w0B0rQ-rg4g0K0B0r0a0e0f0a0e0a0e0", "application_name": "3573e61c-9733-47a0-a81a-
3bb10fcedeed", "scope": "", "expires_in": "3599", "refresh_count": "0", "status": "approved" }
```

Figure 2. Token Coding Result

## 2. Ward Search

Ward search is divided into four categories:

### a) Search by ID

```
public function searchID($id)
{
    // Contoh : 7a704c1e-fe00-409f-a20b-6d28bc21d904
    $url = Http::withToken($this->createToken())->get($this->getUrl().'/Location/'. $id);
    return json_decode($url->getBody(), true);
}
```

Figure 4. Code for Search Based on ID

```
{
  "address": {
    "city": "Jakarta",
    "country": "ID",
    "extension": {
      "extension": {
        "url": "province",
        "valueCode": "10",
        "url": "city",
        "valueCode": "1010",
        "url": "district",
        "valueCode": "1010101",
        "url": "village",
        "valueCode": "101010101",
        "url": "rt",
        "valueCode": "11"
      },
      "url": "rt",
      "valueCode": "22"
    },
    "url": "http://www.kemkes.go.id/4/StructureDefinition/administrative-city",
    "line": "Gd. Prof. Dr. Sujudi Lt.5, Jl. H.R. Rasuna Said Blok X5 Kav. 4-9 Kuningan",
    "postalCode": "122590",
    "use": "work",
    "description": "Ruang 1A, Poliklinik Bedah Rawat Jalan Terpadu, Lantai 2, Gedung G",
    "id": "cd1797-547a-4e4d-9d-cd4ce0630e380",
    "identifier": {
      "system": "http://sis-id.kemkes.go.id/location/1000001",
      "value": "G-2-R-1A"
    },
    "managingOrganization": {
      "reference": "Organization/10000004",
      "meta": {
        "lastUpdated": "2023-08-12T10:17:21.131742+00:00",
        "versionId": "MTY5MTgzNTQ0MTZzMTE0MjAwMA=="
      },
      "mode": "instance",
      "name": "Ruang 1A IRJT",
      "physicalType": {
        "coding": {
          "code": "ro",
          "display": "Room",
          "system": "http://terminology.hl7.org/Code/System/location-physical-type"
        },
        "position": {
          "altitude": 0,
          "latitude": 106.83239885393944,
          "longitude": -6.23115426275766,
          "resourceType": "Location",
          "status": "inactive",
          "telecom": {
            "system": "phone",
            "use": "work",
            "value": "23238",
            "system": "fax",
            "use": "work",
            "value": "23239",
            "system": "email",
            "value": "second wing admissions",
            "system": "url",
            "use": "work",
            "value": "http://samples.org/southwing"
          }
        }
      }
    }
  }
}
```

Figure 5. Search Based on ID Result

### b) Searching Treatment Rooms Based on Identifier

```
public function searchIdentifier($id)
{
    // Contoh : Kamar Testing
    $url = Http::withToken($this->createToken())->get($this->getUrl().'/Location',
        ['identifier' => 'http://sys-ids.kemkes.go.id/location/10083042'].$id
    );
    return json_decode($url->getBody(), true);
}
```

Figure 6. Code for Searching Treatment Rooms Based on Identifier



```
{ "link": [ { "relation": "search", "url": "https://api-satusehat-dev.dto.kemkes.go.id/thir-r4/v1/Location/?identifier=http%3A%2F%2Fsys-ids.kemkes.go.id%2Flocation%2F1000001%7CG-2-R-1A&organization=fbac120f-3383-41e1-96e1-276249780343", "rel": "first", "url": "https://api-satusehat-dev.dto.kemkes.go.id/thir-r4/v1/Location/?identifier=http%3A%2F%2Fsys-ids.kemkes.go.id%2Flocation%2F1000001%7CG-2-R-1A&organization=fbac120f-3383-41e1-96e1-276249780343", "rel": "self", "url": "https://api-satusehat-dev.dto.kemkes.go.id/thir-r4/v1/Location/?identifier=http%3A%2F%2Fsys-ids.kemkes.go.id%2Flocation%2F1000001%7CG-2-R-1A&organization=fbac120f-3383-41e1-96e1-276249780343" }, { "relation": "Bundle", "total": 0, "type": "searchset", "entry": [] } ] }
```

Figure 7. Search Result for Treatment Rooms Based on Identifier

#### c) Searching Treatment Based on Organization ID

```
public function searchOrgID($keyword)
{
    // Contoh : 10083842
    $url = Http::withToken($this->createToken())->get($this->getUrl().'/Location',
        ['organization' => $keyword]
    );
    return json_decode($url->getBody(), true);
}
```

Figure 8. Code for Searching Treatment Based on Organization ID

```
{ "entry": [ { "fullUrl": "https://api-satusehat-dev.dto.kemkes.go.id/thir-r4/v1/Location/96a70474-fec6-4be5-8e05-2323b40db6c7", "resource": { "description": "KB PAUD SION LAE HOLE DATA BIAN", "id": "96a70474-fec6-4be5-8e05-2323b40db6c7", "identifier": [ { "system": "http://sys-ids.kemkes.go.id/location/1000104765", "value": "KB PAUD SION LAE HOLE" } ], "managingOrganization": [ { "reference": "Organization/542786df-57f9-4e6f-acad-be97ac12a3f7" }, { "meta": { "lastUpdated": "2022-11-19T03:52:51.289429+00:00", "versionId": "MTY2ODgyOTk3MTI4OTQyOTAwMA" }, "mode": "instance", "name": "KB PAUD SION LAE HOLE", "physicalType": { "coding": [ { "code": "si", "display": "Site", "system": "http://terminology.hl7.org/CodeSystem/location-physical-type" } ] }, "resourceType": "Location", "status": "active" } ], "fullUrl": "https://api-satusehat-dev.dto.kemkes.go.id/thir-r4/v1/Location/d0988189-9f2d-4184-a234-1e2ac62262be", "resource": { "description": "KB PAUD BANGUN JAYA DATA BIAN", "id": "d0988189-9f2d-4184-a234-1e2ac62262be", "identifier": [ { "system": "http://sys-ids.kemkes.go.id/location/1000104765", "value": "KB PAUD BANGUN JAYA" } ], "managingOrganization": [ { "reference": "Organization/542786df-57f9-4e6f-acad-be97ac12a3f7" }, { "meta": { "lastUpdated": "2022-11-19T03:52:35.431510+00:00", "versionId": "MTY2ODgyOTk3MTI4OTQyOTAwMA" }, "mode": "instance", "name": "KB PAUD BANGUN JAYA", "physicalType": { "coding": [ { "code": "si", "display": "Site", "system": "http://terminology.hl7.org/CodeSystem/location-physical-type" } ] }, "resourceType": "Location", "status": "active" } ], "fullUrl": "https://api-satusehat-dev.dto.kemkes.go.id/thir-r4/v1/Location/404b0719-a149-41b6-961a-966a43456e8d", "resource": { "description": "SMKN 1 BARBULUAN DATA BIAN", "id": "404b0719-a149-41b6-961a-966a43456e8d", "identifier": [ { "system": "http://sys-ids.kemkes.go.id/location/1000104765", "value": "SMKN 1 BARBULUAN" } ], "managingOrganization": [ { "reference": "Organization/542786df-57f9-4e6f-acad-be97ac12a3f7" }, { "meta": { "lastUpdated": "2022-11-19T03:52:26.767345+00:00", "versionId": "MTY2ODgyOTk3MTI4OTQyOTAwMA" }, "mode": "instance", "name": "SMKN 1 BARBULUAN", "physicalType": { "coding": [ { "code": "si", "display": "Site", "system": "http://terminology.hl7.org/CodeSystem/location-physical-type" } ] }, "resourceType": "Location", "status": "active" } ], "link": [ { "relation": "search", "url": "https://api-satusehat-dev.dto.kemkes.go.id/thir-r4/v1/Location/?organization=542786df-57f9-4e6f-acad-be97ac12a3f7", "rel": "first", "url": "https://api-satusehat-dev.dto.kemkes.go.id/thir-r4/v1/Location/?organization=542786df-57f9-4e6f-acad-be97ac12a3f7", "rel": "self", "url": "https://api-satusehat-dev.dto.kemkes.go.id/thir-r4/v1/Location/?organization=542786df-57f9-4e6f-acad-be97ac12a3f7" }, { "relation": "Bundle", "total": 3, "type": "searchset" } ] }
```

Figure 9. Search Result for Treatment Based on Organization ID

#### d) Searching Based on Location Name

```
public function searchName($keyword)
{
    // Contoh : Ruang
    $url = Http::withToken($this->createToken())->get($this->getUrl().'/Location',
        ['name' => $keyword]
    );
    return json_decode($url->getBody(), true);
}
```

Figure 10. Code for Searching Based on Location Name

```
{ "link": [ { "relation": "search", "url": "https://api-satusehat-dev.dto.kemkes.go.id/thir-r4/v1/Location/?name=a&organization=fbac120f-3383-41e1-96e1-276249780343", "rel": "first", "url": "https://api-satusehat-dev.dto.kemkes.go.id/thir-r4/v1/Location/?name=a&organization=fbac120f-3383-41e1-96e1-276249780343", "rel": "self", "url": "https://api-satusehat-dev.dto.kemkes.go.id/thir-r4/v1/Location/?name=a&organization=fbac120f-3383-41e1-96e1-276249780343" }, { "relation": "Bundle", "total": 0, "type": "searchset", "entry": [] } ] }
```

Figure 11. Search Result Based on Location Name

### ***Phase 2 with Medium Priority***

#### **1. Limitations of Other Modules Compared to the Location Module**

In this phase, the author examines the limitations of other modules in comparison to the location module. The assessment is based on whether the modules can already implement CRUD (Create-Read-Update-Delete) operations to determine if the tested modules have similar feature completeness or not.

**Table 3. Comparison of Limitations of Other Modules with the Location Module**

Module Name	Testing Criteria				
	Create	Read	Update	Delete	Descriptions
Patient	X	V	X	X	Search is complete Not yet able to process patient data
Related Person	V	V	V	V	Cannot search by name yet The module can process data
Practitioner	X	V	X	X	Search is complete Not yet able to process medical personnel data
Practitioner Role	V	V	V	V	The module is complete
Organization	V	V	V	V	The module is complete
Encounter	V	V	V	V	The module is complete
Condition	V	V	V	V	The module is complete
Episode of Care	V	V	V	V	The module is complete
Imaging Study	V	V	V	V	The module is complete
Service Request	V	V	V	V	The module is complete

#### **2. Registering a Treatment Room**

The registration of a treatment room refers to the process of creating a medical room where patients receive healthcare services.

```
$body = {
  "resourceType" => "Location",
  "identifier" => [
    {
      "system" => "http://sys-ids.kemkes.go.id/location/1000001",
      "value" => $request->ruang_id
    }
  ],
  "status" => "active",
  "name" => $request->ruang_nama,
  "description" => $dataRuang->deskripsi,
  "mode" => "instance",
  "telecom" => [
    {
      "system" => "phone",
      "value" => $dataCentral->no_telepon,
      "use" => "work"
    },
    {
      "system" => "email",
      "value" => $dataCentral->email,
      "use" => "work"
    }
  ],
  "address" => [
    {
      "use" => "work",
      "line" => [
        $dataRuang->lokasi, ". ", $dataCentral->alamat
      ],
      "city" => $dataCentral->kota,
      "postalCode" => $dataCentral->kodepos,
      "country" => "ID",
      "extension" => [
        {
          "url" => "https://fhir.kemkes.go.id/r4/StructureDefinition/administrativeCode",
          "extension" => [
            {
              "url" => "province",
              "valueCode" => $dataClient->kode_propinsi
            },
            {
              "url" => "city",
              "valueCode" => $dataClient->kode_kota
            },
            {
              "url" => "district",
              "valueCode" => $dataClient->kode_kecamatan
            }
          ]
        }
      ]
    }
  ],
  "physicalType" => [
    {
      "coding" => [
        {
          "system" => "http://terminology.hl7.org/CodeSystem/location-physical-type",
          "code" => "ro",
          "display" => "Room"
        }
      ]
    }
  ],
  "position" => [
    {
      "longitude" => -6.23115426275766,
      "latitude" => 106.83239085393944,
      "altitude" => 0
    }
  ],
  "managingOrganization" => [
    {
      "reference" => "Organization/18863842"
    }
  ]
}
```

Figure 12. Coding for Registering a Treatment Room

```
{
  "address": {
    "city": "Jakarta",
    "country": "ID",
    "extension": [
      {
        "extension": [
          {
            "url": "province",
            "valueCode": "10"
          },
          {
            "url": "city",
            "valueCode": "1010"
          },
          {
            "url": "district",
            "valueCode": "1010101"
          },
          {
            "url": "village",
            "valueCode": "1010101101"
          },
          {
            "url": "rt",
            "valueCode": "1"
          },
          {
            "url": "rw",
            "valueCode": "2"
          }
        ],
        "url": "https://hlir.kemkes.go.id/v4/StructureDefinition/administrativeCode"
      }
    ],
    "line": [
      "Gd. Prof. Dr. Sujudi Lt.5, Jl. H.R. Rasuna Said Blok X5 Kav. 4-9 Kuningan"
    ],
    "postalCode": "12950",
    "use": "work",
    "description": "Ruang 1A, Poliklinik Bedah Rawat Jalan Terpadu, Lantai 2, Gedung G",
    "id": "dc01c797-547a-4e4d-97cd-4ece0630e380",
    "identifier": [
      {
        "system": "http://sys-ids.kemkes.go.id/location/1000001",
        "value": "G-2-R-1A"
      }
    ],
    "managingOrganization": {
      "reference": "Organization/10000004",
      "meta": {
        "lastUpdated": "2022-08-23T06:34:44.684738+00:00",
        "versionId": "MTY2MTI2NjQ0NDY4NDczODAwMA"
      },
      "mode": "instance",
      "name": "Ruang 1A IRJT",
      "physicalType": {
        "coding": [
          {
            "code": "ro",
            "display": "Room",
            "system": "http://terminology.hl7.org/CodeSystem/location-physical-type"
          }
        ],
        "position": {
          "altitude": 0,
          "latitude": 106.83239885393944,
          "longitude": -6.23115426275766,
          "resourceType": "Location",
          "status": "active",
          "telecom": [
            {
              "system": "phone",
              "use": "work",
              "value": "2328"
            },
            {
              "system": "fax",
              "use": "work",
              "value": "2329"
            },
            {
              "system": "email",
              "value": "second wing admissions"
            },
            {
              "system": "url",
              "use": "work",
              "value": "http://sampleorg.com/southwing"
            }
          ]
        }
      }
    }
  }
}
```

Figure 13. Result of Coding for Registering a Treatment Room

### 3. Modifying Treatment Room Data

[illegible]

Figure 14. Coding for Modifying Treatment Room Data

```
{ "address": { "city": "Jakarta", "country": "ID", "extension": [ { "extension": [ { "url": "province", "valueCode": "10" }, { "url": "city", "valueCode": "1010" }, { "url": "district", "valueCode": "1010101" }, { "url": "village", "valueCode": "1010101101" }, { "url": "rt", "valueCode": "1" }, { "url": "rw", "valueCode": "2" } ] }, "url": "https://fhir.kemkes.go.id/r4/StructureDefinition/administrativeCode" } ], "line": [ "Gd. Prof. Dr. Sujudi Lt.5, Jl. H.R. Rasuna Said Blok X5 Kav. 4-9 Kuningan" ], "postalCode": "12950", "use": "work", "description": "Ruangan 1A, Poliklinik Bedah Rawat Jalan Terpadu, Lantai 2, Gedung G", "id": "dc01c797-547a-4e4d-97cd-4ece0630e380", "identifier": [ { "system": "http://sys-ids.kemkes.go.id/location/1000001", "value": "G-2-R-1A" } ], "managingOrganization": { "reference": "Organization/10000004" }, "meta": { "lastUpdated": "2022-09-23T04:13:17.480967+00:00", "versionId": "MTY2MzkwNjM5NzQ4MDk2NzAwMA" }, "mode": "instance", "name": "Ruangan 1A IRJT", "physicalType": { "coding": [ { "code": "ro", "display": "Room", "system": "http://terminology.hl7.org/CodeSystem/location-physical-type" } ] }, "position": { "altitude": 0, "latitude": 106.83239885393944, "longitude": -6.23115426275766 }, "resourceType": "Location", "status": "inactive", "telecom": [ { "system": "phone", "use": "work", "value": "2328" }, { "system": "fax", "use": "work", "value": "2329" }, { "system": "email", "value": "second wing admissions" }, { "system": "url", "use": "work", "value": "http://sampleorg.com/southwing" } ] }
```

Figure 15. Result of Coding for Modifying Treatment Room Data

### Phase 3 with Low Priority

#### 1. Deactivating Treatment Room

```
public function deleteLocation($id)
{
    $result = Http::withToken($this->createToken())
        ->withHeaders([
            'Content-Type' => 'application/json-patch+json'
        ])
        ->patch($this->getUrl().'/Location/'.$id, [
            "op" => "replace",
            "path" => "/status",
            "value" => "inactive"
        ], 200, [], JSON_UNESCAPED_SLASHES);

    $value = json_decode($result->getBody(), true);
    return $value;
}
```

Figure 16. Coding for Deactivating Treatment Room

```
{ "address": { "city": "Jakarta", "country": "ID", "extension": [ { "extension": [ { "url": "province", "valueCode": "10" }, { "url": "city", "valueCode": "1010" }, { "url": "district", "valueCode": "1010101" }, { "url": "village", "valueCode": "1010101101" }, { "url": "rt", "valueCode": "1" }, { "url": "rw", "valueCode": "2" } ] }, "url": "https://fhir.kemkes.go.id/r4/StructureDefinition/administrativeCode" } ], "line": [ "Gd. Prof. Dr. Sujudi Lt.5, Jl. H.R. Rasuna Said Blok X5 Kav. 4-9 Kuningan" ], "postalCode": "12950", "use": "work", "description": "Ruangan 1A, Poliklinik Bedah Rawat Jalan Terpadu, Lantai 2, Gedung G", "id": "dc01c797-547a-4e4d-97cd-4ece0630e380", "identifier": [ { "system": "http://sys-ids.kemkes.go.id/location/1000001", "value": "G-2-R-1A" } ], "managingOrganization": { "reference": "Organization/10000004" }, "meta": { "lastUpdated": "2023-08-17T04:26:15.519659+00:00", "versionId": "MTY5MjMjMjM3NTUxOTAwMA" }, "mode": "instance", "name": "Ruangan 1A IRJT", "physicalType": { "coding": [ { "code": "ro", "display": "Room", "system": "http://terminology.hl7.org/CodeSystem/location-physical-type" } ] }, "position": { "altitude": 0, "latitude": 106.83239885393944, "longitude": -6.23115426275766 }, "resourceType": "Location", "status": "inactive", "telecom": [ { "system": "phone", "use": "work", "value": "2328" }, { "system": "fax", "use": "work", "value": "2329" }, { "system": "email", "value": "second wing admissions" }, { "system": "url", "use": "work", "value": "http://sampleorg.com/southwing" } ] }
```

Figure 17. Result of Deactivating Treatment Room Coding

### Sprint Review and Sprint Retrospective

During the sprint review and sprint retrospective phases, the development team conducts testing every 3 days until the sprint is completed. This testing serves a dual purpose: evaluating the completeness of the SATUSEHAT API in processing the data created by the author and discussing any findings. The sprint is considered finished when each product backlog item has successfully returned the requested data in accordance with the application's requirements. However, there was one product backlog item that did not return data: the search for treatment rooms based on room name. Despite adhering to the SATUSEHAT API guidelines, this search did not yield the expected



results. This issue was actively addressed by the development team in collaboration with the SATUSEHAT API guidelines.

### **Discussion**

Previous research by Leni Fitriani, Prayoga Hakim, and R. Mujahid Al Haq titled "E-Commerce For Village Information System Using Agile Methodology" resulted in an e-commerce product aimed at marketing rural products online. This e-commerce product can also be further developed into an Android platform (Fitriani, Hakim and Al Haq, 2022).

Additionally, the study conducted by Adiharsa Winahyu, Lutfan Lazuardi, and Mubasysyir Hasanbasri, titled "Developing Interoperability of Blood Stock Information Based on Web Service at the Indonesian Red Cross in Yogyakarta Special Region Using the Scrum Method," led to the automated distribution of blood stock information from Twitter to affiliate websites. Following the distribution of blood stock information, user satisfaction reached 85% (Winahyu, Lazuardi and Hasanbasri, 2017).

Usman Ependi, through his research "Implementation of the Scrum Model in the Student Admission Information System of Politeknik Pariwisata Palembang," developed the SMM Poltekpar Palembang information system that effectively meets user needs (Ependi, 2018).

In the study conducted by Asido Togap U Sibuea, Siska Komala Sari, and Wahyu Hidayat, titled "Kiosk-K Application for Hospital Public Relations and Information," a web-based application was developed. This application fulfills user needs, allowing patients to register for appointments, print appointments for different days, view clinic information and doctor schedules, and access information about routes to clinics or rooms (Sibuea, Sari and Hidayat, 2018).

Lastly, Lia Farokhah, Fadhli Almu'iini Ahda, and Lukman Hakim, in their research titled "Implementation of SCRUM in Designing the Emergency Button Application for PMI Kota Malang," developed an Emergency Button application to meet the needs of stakeholders, specifically PMI Kota Malang. The application organizes work timelines and provides detailed research to prioritize product backlogs (Farokhah, Almu'iini and Hakim, 2020).

### **Conclusion**

In this research, it can be concluded that the implementation of the Agile Scrum methodology to implement the SATUSEHAT API has been successfully carried out. We have obtained results of this research show the use of the SATUSEHAT API, including: standardized API documentation between healthcare facilities, making it more organized and complete, facilitated data exchange due to uniform data storage, whereas previously each healthcare facility had its own data format, and detailed patient medical records can be monitored, even if the patient has received treatment at different healthcare facilities.

Additionally, the features within the SATUSEHAT API were mostly able to retrieve data according to commands. However, one specific feature, the search by room name based on location, was not successfully tested and did not retrieve the expected data. To strengthen the discussion and conclusion, further analysis is warranted. We must establish a more robust connection between the observed outcomes and the broader implications for future work. It is apparent that the limitations encountered with the room name-based location search feature require thorough examination and potential revisions.

Future research could focus on addressing these limitations to ensure the comprehensive functionality of the SATUSEHAT API. Additionally, exploring the scalability and adaptability of the Agile Scrum methodology for similar projects may pave the way for more effective and efficient development processes in the future. Furthermore, in the future implementation of the SATUSEHAT API, it can be integrated with medical equipment such as cardiographs, hematology analyzers, pulse oximeters, and others that can transmit real-time data to medical personnel. The medical data from SATUSEHAT can serve as a reference for healthcare professionals in researching diseases.

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