Integração de Sistemas

Service Oriented Middleware for Interoperability and Open Data

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*Abstract*

(Remember, a good abstract is equal to Zip(Introduction) + Zip(Conclusion). So, this is the last section to be written. Delete this. Always try to keep formatting present in the document. Delete this.).

# Introduction

Na perspetiva da Internet das Coisas (IoT), a fragmentação de soluções em “estruturas isoladas” compromete a interoperabilidade e a partilha de dados.

O projeto SOMIOD visa superar essas limitações, ao introduzir um middleware que estipula de forma padrão o acesso e a escrita de dados na IoT.

* Este projeto tem como o objetivo definir uma arquitetura de middleware para uniformizar operações IoT.
* Implementar operações CRUD para recursos como *applications*, *containers*, *records* e *notifications*.
* Facilitar a descoberta de recursos através de operações específicas na API RESTful.
* Demonstrar a aplicabilidade prática do SOMIOD num cenário de teste no contexto IoT.

# System Architecture

A seguinte arquitetura foi uma peça fundamental para entender o funcionamento do projeto SOMIOD.

1. Arquitetura do projeto SOMIOD

## Middleware SOMIOD

O nosso middleware SOMIOD é a peça central deste cenário, pois atua como o elo de integração entre dispositivos IoT, e qualquer aplicação que um desenvolvedor possa criar que cumpra as suas normas, promovendo interoperabilidade. O SOMIOD dá suporte a operações CRUD para os múltiplos recursos (application, container, record e notification). É nele que é feita a serialização dos dados em XML, a persistência dos dados na base de dados e a criação de notificações por HTTP e MQTT.

O SOMIOD é fácil de utilizar porque garantimos que o desenvolvedor recebe mensagens de erro detalhadas, para dar o máximo suporte durante o processo de desenvolvimento. Além disso, optámos por utilizar o nó raiz do XML para identificar o recurso a que o desenvolvedor se está a referir, em vez de exigir o atributo **res\_type** no header, como mencionado no enunciado. Dessa forma, eliminamos a necessidade de passar esse atributo adicional dentro do corpo do nosso recurso e termos de fazer a separação no XML do **res\_type** da restante informação do recurso. Com esta abordagem conseguimos reduzir alguma da complexidade e tornámos o processo o mais intuitivo e eficiente para o desenvolvedor.

Para além dos requisitos do enunciado, para facilitarmos o processo de desenvolvimento criámos um endpoint (https://localhost:44322/api/somiod/{name}/parent) que ajuda o desenvolvedor a descobrir as hierarquias existentes entre os recursos do middleware, no somiod-locate é indicado o recurso para o qual queremos obter a hierarquia, caso seja um container, é retornado o nome da aplicação cujo o filho foi o container passado no url, caso seja um record ou uma notification, é retornado o nome do container a que o recurso(record ou notification) pertence, bem como, o nome da aplicação a que o container encontrado pertence.

## Component B

Use either SI (MKS) or CGS as primary units. (SI units are encouraged.) English units may be used as secondary units (in parentheses). An exception would be the use of English units as identifiers in trade, such as “3.5-inch disk drive”.

* Avoid combining SI and CGS units, such as current in amperes and magnetic field in oersteds. This often leads to confusion because equations do not balance dimensionally. If you must use mixed units, clearly state the units for each quantity that you use in an equation.
* Do not mix complete spellings and abbreviations of units: “Wb/m2” or “webers per square meter”, not “webers/m2”. Spell out units when they appear in text: “. . . a few henries”, not “. . . a few H”.
* Use a zero before decimal points: “0.25”, not “.25”. Use “cm3”, not “cc”. (*bullet list*)

## Component C

This is example text. The equations are an exception to the prescribed specifications of this template. You will need to determine whether or not your equation should be typed using either the Times New Roman or the Symbol font (please no other font). To create multileveled equations, it may be necessary to treat the equation as a graphic and insert it into the text after your paper is styled.

## Component D

This is example text. The word “data” is plural, not singular. The subscript for the permeability of vacuum **0, and other common scientific constants, is zero with subscript formatting, not a lowercase letter “o”.

* In American English, commas, semicolons, periods, question and exclamation marks are located within quotation marks only when a complete thought or name is cited, such as a title or full quotation. When quotation marks are used, instead of a bold or italic typeface, to highlight a word or phrase, punctuation should appear outside of the quotation marks. A parenthetical phrase or statement at the end of a sentence is punctuated outside of the closing parenthesis (like this). (A parenthetical sentence is punctuated within the parentheses.)
* A graph within a graph is an “inset”, not an “insert”. The word alternatively is preferred to the word “alternately” (unless you really mean something that alternates).
* Do not use the word “essentially” to mean “approximately” or “effectively”.
* In your paper title, if the words “that uses” can accurately replace the word “using”, capitalize the “u”; if not, keep using lower-cased.
* Be aware of the different meanings of the homophones “affect” and “effect”, “complement” and “compliment”, “discreet” and “discrete”, “principal” and “principle”.
* Do not confuse “imply” and “infer”.
* The prefix “non” is not a word; it should be joined to the word it modifies, usually without a hyphen.
* There is no period after the “et” in the Latin abbreviation “et al.”.
* The abbreviation “i.e.” means “that is”, and the abbreviation “e.g.” means “for example”.

## Component E

This is example text. This is example text. This is example text.

#### This is example text. xcvzxcvcxvzxcvzcxvzx

#### This is example text. Positioning Figures and Tables: Place figures and tables at the top and bottom of columns. Avoid placing them in the middle of columns. Large figures and tables may span across both columns. Figure captions should be below the figures; table heads should appear above the tables. Insert figures and tables after they are cited in the text. Use the abbreviation “Fig. 1”, even at the beginning of a sentence.

1. Table Type Styles

| Table Head | Table Column Head | | |
| --- | --- | --- | --- |
| Table column subhead | Subhead | Subhead |
| copy | More table copya |  |  |

1. Sample of a Table footnote. (*Table footnote*)
2. Example of a figure caption. (*figure caption*)

This is example text. Figure Labels: Use 8 point Times New Roman for Figure labels. Use words rather than symbols or abbreviations when writing Figure axis labels to avoid confusing the reader. As an example, write the quantity “Magnetization”, or “Magnetization, M”, not just “M”. If including units in the label, present them within parentheses. Do not label axes only with units. In the example, write “Magnetization (A/m)” or “Magnetization {A[m(1)]}”, not just “A/m”. Do not label axes with a ratio of quantities and units. For example, write “Temperature (K)”, not “Temperature/K”.

# Evaluation

This is example text. Blá, blá, blá introducing this main section...

## Test bed

Start by presenting the test bed (the HW and SW environment you used to test and evaluate your solution). So the first sub section can be called Test bed.

## Data analysis

For instance, you can present charts and data tables that describe the temperature and humidity behavior by measuring night and days...

## Data access

For instance, present here the min, max, avg and std deviation of the time taken to access story data for one month ago, 2, 10, 100 months, etc. as historical data is crucial for building monitoring applications. Again, present charts for that and describe them.

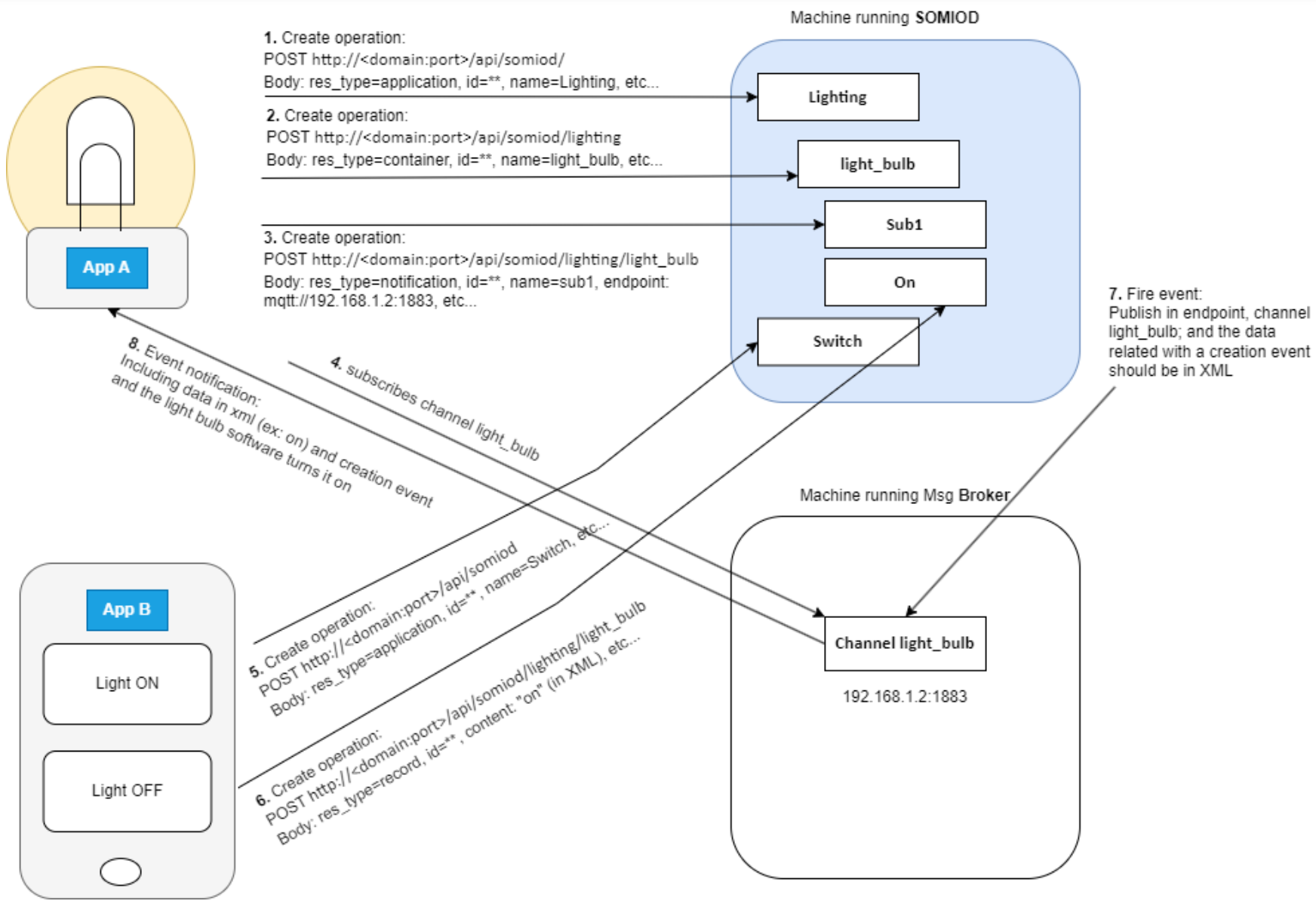
## Other1

Present other kind of metrics that characterize the behavior of your system in load states...

## Other n

Present other kind of metrics that characterize the behavior of your system in load states...

# Integration/App Development



## Application X

Blá, blá, Blá, blá,Blá, blá,Blá, blá,Blá, blá,Blá, blá,Blá, blá,Blá, blá,.

## Application Y

Blá, blá, Blá, blá,Blá, blá,Blá, blá,Blá, blá,Blá, blá,Blá, blá,Blá, blá,.

# Conclusions and Future Work

Finalizado o Projeto de Integração de Sistemas, podemos afirmar que com ele solidificámos a nossa compreensão sobre a arquitetura de um middleware e componentes inerentes que moldaram a solução.

Este projeto não apenas fortaleceu a nossa compreensão prática na area de integração de sistemas, como também nos permitiu desenvolver *softskills* (trabalho em equipas, comunicação, gestão de versões, organização...).

Em resumo, o SOMIOD não é apenas uma solução em prol da unidade corricular Integração de Sistemas, mas também um exemplo prático de como esta contribui para um futuro mais inteligente e automatizado. Este projeto é uma base sólida para enfrentar desafios no futuro, tendo contribuido para a nossa experiência académica e profissional.

# references

(every citation present in the text must be described here. Delete this)

1. G. Eason, B. Noble, and I. N. Sneddon, “On certain integrals of Lipschitz-Hankel type involving products of Bessel functions,” Phil. Trans. Roy. Soc. London, vol. A247, pp. 529–551, April 1955. *(references)*
2. J. Clerk Maxwell, A Treatise on Electricity and Magnetism, 3rd ed., vol. 2. Oxford: Clarendon, 1892, pp.68–73.
3. I. S. Jacobs and C. P. Bean, “Fine particles, thin films and exchange anisotropy,” in Magnetism, vol. III, G. T. Rado and H. Suhl, Eds. New York: Academic, 1963, pp. 271–350.
4. K. Elissa, “Title of paper if known,” unpublished.
5. R. Nicole, “Title of paper with only first word capitalized,” J. Name Stand. Abbrev., in press.
6. Y. Yorozu, M. Hirano, K. Oka, and Y. Tagawa, “Electron spectroscopy studies on magneto-optical media and plastic substrate interface,” IEEE Transl. J. Magn. Japan, vol. 2, pp. 740–741, August 1987 [Digests 9th Annual Conf. Magnetics Japan, p. 301, 1982].
7. M. Young, The Technical Writer’s Handbook. Mill Valley, CA: University Science, 1989.

# Appendix

*Appendix A*

## CRUD Application Resource

1. Read

curl -X GET "https://localhost:44322/api/somiod/App1"

2. Create

curl -X POST "https://localhost:44322/api/somiod"

-H "Content-Type: application/xml"

-d "<Application>

<Name>App1</Name>

</Application>"

3. Update

curl -X PATCH "https://localhost:44322/api/somiod/App1"

-H "Content-Type: application/xml"

-d "<Application>

<Name>App2</Name>

</Application>"

4. Delete

curl -X DELETE "https://localhost:44322/api/somiod/App2"

## CRUD Container Resource

1. Read

curl -X GET "https://localhost:44322/api/somiod/App1/Cont1"

2. Create

curl -X POST "https://localhost:44322/api/somiod/App1"

-H "Content-Type: application/xml"

-d "<Container>

<Name>Cont1</Name>

</Container>"

3. Update

curl -X PATCH "https://localhost:44322/api/somiod/App1/Cont1"

-H "Content-Type: application/xml"

-d "<Container>

<Name>Cont2</Name>

<Parent>38</Parent>

</Container>"

4. Delete

curl -X DELETE "https://localhost:44322/api/somiod/App1/Cont1"

## CRUD Record Resource

1. Read

curl -X GET

"https://localhost:44322/api/somiod/App1/Cont1/record/Record1"

2. Create

curl -X POST "https://localhost:44322/api/somiod/App1/Cont1"

-H "Content-Type: application/xml"

-d "<Record>

<Name>Record1</Name>

<Content>On</Content>

</Record>"

3. Delete

curl -X DELETE

"https://localhost:44322/api/somiod/App1/Cont1/record/Record1"

## CRUD Notification Resource

1. Read

curl -X GET "https://localhost:44322/api/somiod/App1/Cont1/notification/Not1"

2. Create

curl -X POST "https://localhost:44322/api/somiod/App1/Cont1"

-H "Content-Type: application/xml"

-d "<Notification>

<Name>Not1</Name>

<Event>1</Event>

<Endpoint>mqtt://example.com</Endpoint>

<Enabled>true</Enabled>

</Notification>"

3. Update

curl -X PATCH

"https://localhost:44322/api/somiod/App1/Cont1/notification/Not1"

-H "Content-Type: application/xml"

-d "<Notification>

<Enabled>0</Enabled>

</Notification>"

4. Delete

curl -X DELETE

"https://localhost:44322/api/somiod/App1/Cont1/notification/Not1"

## Locate

1. Locate Applications

curl -X GET "https://localhost:44322/api/somiod"

-H "somiod-locate: Application"

2. Locate containers, record ou notifications de uma aplicação

curl -X GET "https://localhost:44322/api/somiod/App1"

-H "somiod-locate: container"

3. Locate pais de um containers, record ou notifications

curl -X GET "https://localhost:44322/api/somiod/Not1/parent"

-H "somiod-locate: notification"

*Appendix B*

Use this section to mention the work of each group member, required passwords, way of starting and runing the system, etc.