
DMP du projet "Edge Computing Resource Allocation for Dynamic Networks"

Plan de gestion de données créé à l'aide de DMP OPIDoR, basé sur le modèle "Science Europe : modèle structuré" fourni par Science Europe.

Renseignements sur le plan

Titre du plan	DMP du projet "Edge Computing Resource Allocation for Dynamic Networks"
Livrable	Livrable D1.2
Version	Version finale
Objet/périmètre du plan	<p>DMP description is included in D1.1. D1.2 provides both risk management analysis and Data Management Plan.</p> <p>It draws the lines and rules to be followed to publish data all over the project.</p> <p>In this OPID DMP, we focus on the application of the DRUID-NET DPM to Inria data and contributions.</p>

Domaines de recherche (selon classification de l'OCDE) Computer and information sciences

Langue eng

Date de création 2023-08-31

Date de dernière modification 2023-08-31

Documents (publications, rapports, brevets, plan expérimental...), sites web associés

- Open datasets : <https://zenodo.org/record/7347970#.Y3z-9dJBxhE>

Plans de gestion en lien avec le projet

- Other datasets from partners : <https://druidnet.netmode.ntua.gr/documents/>

Renseignements sur le projet

Titre du projet Edge Computing Resource Allocation for Dynamic Networks

Acronyme CHIST-ERA DRUID-NET

Résumé The potential offered by the abundance of sensors, actuators and communications in IoT era is hindered by the limited computational capacity of local nodes, making the distribution of

computing in time and space a necessity. Several key challenges need to be addressed in order to optimally and jointly exploit the network, computing, and storage resources, guaranteeing at the same time feasibility for time-critical and mission-critical tasks. Our research takes upon these challenges by dynamically distributing resources when the demand is rapidly time varying. We first propose an analytic mathematical dynamical modelling of the resources, offered workload, and networking environment, that incorporates phenomena met in wireless communications, mobile edge computing data centres, and network topologies. We also propose a new set of estimators for the workload and resources time-varying profiles that continuously update the model parameters. Building on this framework, we aim to develop novel resource allocation mechanisms that take explicitly into account service differentiation and context-awareness, and most importantly, provide formal guarantees for well-defined QoS/QoE metrics. Our research goes well beyond the state of the art also in the design of control algorithms for cyber-physical systems (CPS), by incorporating resource allocation mechanisms to the decision strategy itself. We propose a new generation of controllers, driven by a co-design philosophy both in the network and computing resources utilization. This paradigm has the potential to cause a quantum leap in crucial fields in engineering, e.g., Industry 4.0, collaborative robotics, logistics, multi-agent systems etc. To achieve these breakthroughs, we utilize and combine tools from Automata and Graph theory, Machine Learning, Modern Control Theory and Network Theory, fields where the consortium has internationally leading expertise. Although researchers from Computer and Network Science, Control Engineering and Applied Mathematics have proposed various approaches to tackle the above challenges, our research constitutes the first truly holistic, multidisciplinary approach that combines and extends recent, albeit fragmented results from all aforementioned fields, thus bridging the gap between efforts of different communities. Our developed theory will be extensively tested on available experimental testbed infrastructures of the participating entities. The efficiency of the overall proposed framework will be tested and evaluated under three complex use cases involving mobile autonomous agents in IoT environments: (i) distributed remote path planning of a group of mobile robots with complex specifications, (ii) rapid deployment of mobile agents for distributed computing purposes in disaster scenarios and (iii) mobility-aware resource allocation for crowded areas with pre-defined performance indicators to reach.

Sources de financement

- Agence Nationale de la Recherche : CHIST ERA

Date de début 2020-05-01

Date de fin 2023-12-31

Partenaires

- National Technical University of Athens

Produits de recherche :

1. Automated and Reproducible Application Traces Generation for IoT Applications Dataset (Jeu de données)

Contributeurs

Nom	Affiliation	Rôles
Mitton Nathalie		<ul style="list-style-type: none">• Personne contact pour les données• Responsable du dépôt et de la diffusion des données• Responsable du plan
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Droits d'auteur :

Le(s) créateur(s) de ce plan accepte(nt) que tout ou partie de texte de ce plan soit réutilisé et personnalisé si nécessaire pour un autre plan. Vous n'avez pas besoin de citer le(s) créateur(s) en tant que source. L'utilisation de toute partie de texte de ce plan n'implique pas que le(s) créateur(s) soutien(nen)t ou aient une quelconque relation avec votre projet ou votre soumission.

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Description des données et collecte ou réutilisation de données existantes

Description générale du produit de recherche

Nom	Automated and Reproducible Application Traces Generation for IoT Applications Dataset
Description	<p>This data represents an IoT smart city application. It results from an experiment that runs a firmware on a set of representative nodes that have to exchange packets in a broadcast mode using the IEEE 802.15.4-2006 MAC layer and RPL routing protocol. Each application produces data according to 1 of the 3 following modes: periodic (Tx nodes produce data every x millisecond), event based (modeled with an exponential law with occurrence rate lambda), and hybrid (combination of the two previous modes).</p> <p>Each application has the following parameters :</p> <ul style="list-style-type: none">- Surveillance has 10 sensors and 3 routers that exchange packets with a length of 127B. The generation type is exponential with a lambda of 196.74.- Emergency Response has 40 sensors and 5 routers that exchange packets with a length of 127B. The generation type is hybrid with a lambda of 0.03 and a period of 30 seconds.- HVAC has 100 sensors and 5 routers that exchange packets with a length of 60B. The generation type is periodic with a period of 260 seconds.- Lighting has 100 sensors and 5 routers that exchange packets with a length of 30B. The generation type is exponential with a lambda of 0.00208.- VoIP has 10 sensors and 1 router that exchange packets with a length of 127B. The generation type is hybrid with a lambda of 15.74 and a period of 0.063532 seconds. <p>As a result, this dataset has files containing the following data :</p> <ul style="list-style-type: none">- Received data : name of the receiving node (node_name); message reception time (timestamp); message unique identifier (message_id); reception delay in milliseconds (reception_delay)- Transmitted data : name of the transmitting node (node_name); message transmission time (timestamp); message unique identifier (message_id); success (transmission success) <p>Furthermore, a dataset of an IoT Lighting Application is available at the following link</p>
Type	Jeu de données
Mots clés	<ul style="list-style-type: none">• IoT, dataset, generation ()
Mots clés (texte libre)	
Identifiant pérenne	https://zenodo.org/record/7347970#.Y3z-9dJBxhE
Type d'identifiant	URL
Contient des données personnelles ?	Non
Contient des données sensibles ?	Non
Prend en compte des aspects éthiques ?	Non

Est-ce que des données existantes seront réutilisées ?

Comment seront produites/collectées les nouvelles données ?

Documentation et qualité des données

Quelles métadonnées et quelle documentation (par exemple mode d'organisation des données) accompagneront les données ?

Question sans réponse.

Quelles seront les méthodes utilisées pour assurer la qualité scientifique des données ?

Exigences légales et éthiques, code de conduite

Comment les autres questions juridiques, comme la titularité ou les droits de propriété intellectuelle sur les données, seront-elles abordées ? Quelle est la législation applicable en la matière ?

Description	NA
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Quels sont les aspects éthiques à prendre en compte lors de la collecte des données ?

Question sans réponse.

Traitement et analyse des données

Comment et avec quels moyens seront traitées les données ?

Question sans réponse.

Stockage et sauvegarde des données pendant le processus de recherche

Comment les données seront-elles stockées et sauvegardées tout au long du projet ?

Question sans réponse.

Partage des données et conservation à long terme

Comment les données seront-elles partagées ?

Modalités de partage

Data are published as open data on gitlab and referenced on Zenodo.
The software tool is shared with the data together with tutorial to generate new datasets.

Caractéristiques des fichiers déposés

- <https://zenodo.org/record/7347970#.Y3z-9dJBxE> ()
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Comment les données seront-elles conservées à long terme ?

Question sans réponse.