

Corso di Laurea Triennale in Ingegneria e Scienze Informatiche

Decentralized Messaging System with Aggregate Computing

Tesi di laurea in:
PROGRAMMAZIONE AD OGGETTI

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Abstract

To my family.

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Chapter 1

Introduction

1.1 Context

In a world where Internet of Things (IoT) devices are becoming increasingly prevalent, the need for efficient and reliable communication systems is paramount Figure 1.1. The interactions between neighboring devices play a crucial role in enabling seamless data exchange and coordination, so there is the need to design networks with infrastructures that support scalability, adaptability and reusability [BPV15]. In the past, it was reasonable to use a programming model that focused on the individual computing device, and its relationship with one or more users. However, as systems have grown in scale and complexity with the number of computing devices rising, this method has become inadequate. Traditional network architectures, rely heavily on centralized infrastructures, making them unsuitable for scenarios such as disaster recovery or interactions with neighboring devices. The computational model of *aggregate computing* provides a promising approach to address these challenges by enabling decentralized and self-organizing systems [VBD⁺19]. Building on this concept, this thesis explores how aggregate programming can support a proximity and decentralized messaging system in a network.

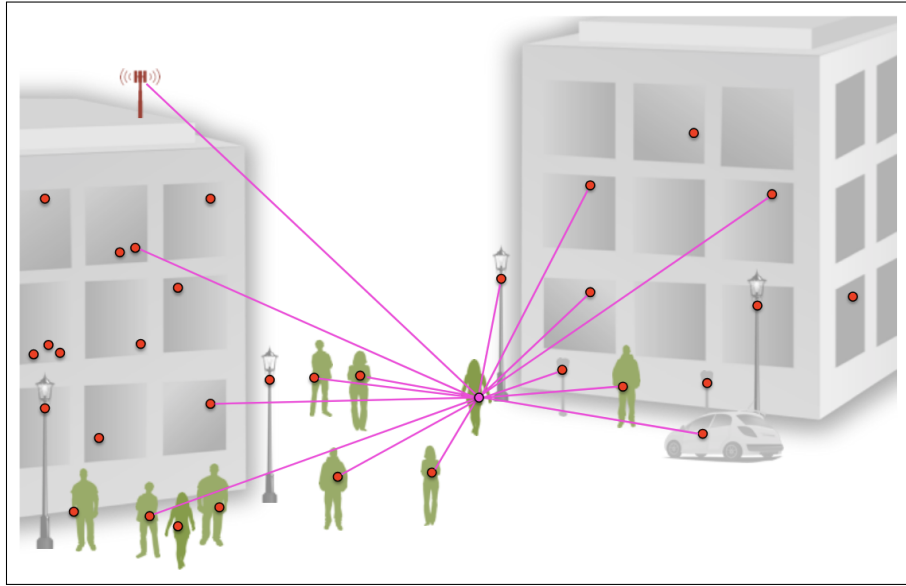


Figure 1.1: A variety of IoT devices communicating with each other.

1.1.1 Aggregate Programming

Aggregate programming is a distributed systems paradigm that simplifies programming large networks of devices by focusing on the global, system-level behavior rather than the individual behavior of each device.

Chapter 2

State of the art

Chapter 3

Contribution

You may also put some code snippet (which is NOT float by default), eg: chapter 3.

3.1 Fancy formulas here

```
1 public class HelloWorld {
2     public static void main(String[] args) {
3         // Prints "Hello, World" to the terminal window.
4         System.out.println("Hello, World");
5     }
6 }
```

Bibliography

- [BPV15] Jacob Beal, Danilo Pianini, and Mirko Viroli. Aggregate programming for the internet of things. *Computer*, 48(9):22–30, 2015.
- [VBD⁺19] Mirko Viroli, Jacob Beal, Francesco Damiani, Stefano Montagna, Danilo Pianini, Luca Ricci, and Franco Zambonelli. *Aggregate programming: from foundations to applications*. Springer, 2019.