



Aalto University  
School of Electrical  
Engineering

# Teamwork kickoff

## Information systems in industry ELEC-E8113

*Start at 12.15!*

# Teamwork assignment

- **Mandatory, but 2 alternatives:**
  - OPC UA (with Java)
  - R (and Python)
- **Teams of two students**
  - 1 is allowed only with an extremely good reason
  - Send an email to the teacher specifying the team members and the selected alternative
- **Parts**
  - Design, implementation, demonstration, document

# Personnel

## Teacher:

- **Dr Ilkka Seilonen**
  - For any issues concerning the teamwork:
  - Email: [ilkka.seilonen@aalto.fi](mailto:ilkka.seilonen@aalto.fi)

# Deadlines and evaluation

- **Deadlines:**

- 12.9.2022 Kickoff
- 24.10.2022 Checkpoint
- 28.11.2022 Deadline

- **Evaluation:**

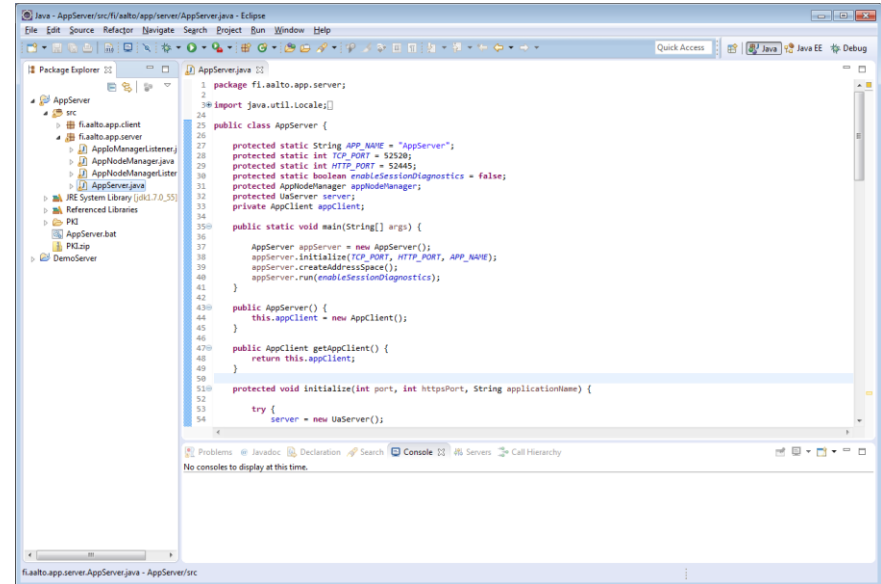
- Design 10 points
- Implementation 10 points
- Demonstration & document 10 points
- Total 30 points (out of 90)

# Teamwork documents

- **Mycourses Assignments/Teamwork folder**
- **Content:**
  1. Introduction to the problem
  2. Instructions for tools
  3. Useful links
  4. Requirements of deliverables

# OPC UA Java SDK and Eclipse

- Design a standard-based OPC UA address space for the given example process
- Implement a Java program that is able to broker between the original and requested data
- Demonstrate that the application works
- Document the new address space
- Use your own laptop

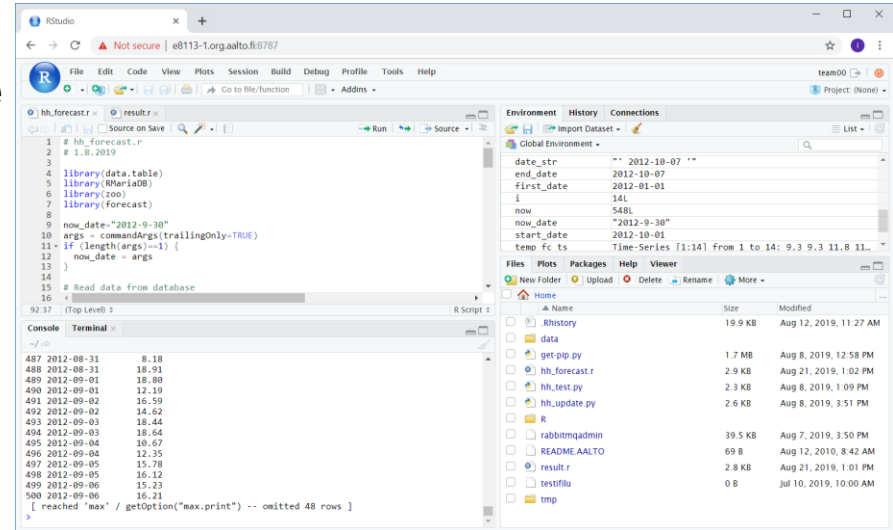


# OPC UA document

- **Idea is to document the address space**
- **Max 2 pages including figures with OPC UA notation**
- **Content:**
  - One or more figures with OPC UA notation describing the designed address space including relevant examples of instances
  - Textual explanations if needed
- **You should have a draft version of this document by the midterm checkpoint! The final version should be at the end of the teamwork.**

# Data analysis with R (and Python)

- Design usage of mathematical ARIMA models for forecasting
- Implement R scripts that are able to forecast electricity consumption of 2 example consumers in 3 situations
- Update data from RabbitMQ
- Demonstrate creation of forecasts
- Document the ARIMA models and forecasts
- Use a virtual machine at Aalto



The screenshot shows the RStudio environment. The script editor displays an R script named 'hh\_forecast.r' with the following code:

```
1 # hh_forecast.r
2 # 1.8.2019
3
4 library(data.table)
5 library(RMariaDB)
6 library(zoo)
7 library(forecast)
8
9 now_date="2012-9-30"
10 args = commandArgs(trailingOnly=TRUE)
11 if (length(args)==1) {
12   now_date = args
13 }
14
15 # Read data from database
16
```

The Environment pane on the right shows the following variables:

Variable	Value
date_str	"2012-10-07"
end_date	"2012-10-07"
first_date	"2012-01-01"
i	141
now_date	"2012-9-30"
now_date	"2012-10-01"
temp_fc	ts

The Files pane on the right shows the following files:

Name	Size	Modified
.Rhistory	19.9 KB	Aug 12, 2019, 11:27 AM
data		
get-pip.py	1.7 MB	Aug 8, 2019, 12:58 PM
hh_forecast.r	2.9 KB	Aug 21, 2019, 1:02 PM
hh_test.py	2.3 KB	Aug 8, 2019, 1:09 PM
hh_update.py	2.6 KB	Aug 8, 2019, 3:51 PM
R		
rabbitmqadmin	39.5 KB	Aug 7, 2019, 3:50 PM
README.AALTO	69 B	Aug 12, 2019, 8:42 AM
result.r	2.8 KB	Aug 21, 2019, 1:01 PM
testiflu	0 B	Jul 10, 2019, 10:00 AM
tmp		

The Console pane at the bottom shows the following output:

```
487 2012-08-31 8.18
488 2012-08-31 18.91
489 2012-09-01 18.80
490 2012-09-01 12.19
491 2012-09-02 16.59
492 2012-09-02 14.62
493 2012-09-03 18.44
494 2012-09-03 18.64
495 2012-09-04 18.67
496 2012-09-04 12.35
497 2012-09-05 15.78
498 2012-09-05 16.12
499 2012-09-06 15.23
500 2012-09-06 16.21
[reached 'max' / getOption("max.print") -- omitted 48 rows]
```



# R document

- **Idea is to document and assess the mathematical models and forecasts**
- **Max 5 pages including figures of the forecasts**
- **Content:**
  - Identified ARIMA models for both customers and all situations
  - Estimated parameters and error terms of the models and their assessment
  - Forecasts and their reliability from the viewpoint of the phenomenon itself
- **This document can be provided at the end of the teamwork. However, you should report some progress by the midterm checkpoint (e.g. one forecast situation done)!**

# Presentations on 28.11.

- **Best teams of both teamworks are asked to present their solution**
- **About 30 min presentations with slides (e.g. PowerPoint)**
- **3 points for both team members for replacing shortcomings in assignments or exam**