



Time Sheet System (TSS)

JavaEE Web Applications 2018

Course Project

System Vision and Requirements Version 1.3 (May 17 2018)

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TIME SHEET SYSTEM (TSS)

SYSTEM VISION

The German federal law for minimum wages („Mindestlohngesetz“) requires that employees with a monthly income below a certain amount (currently 850€) fill time sheets about their working hours, vacation, illness, etc. This enables examination and verification of the minimum wage guaranteed by the law.

In the university context, this means that most of the student assistants have to report the times on a weekly base. Both the student assistant as the employee as well as the supervisor as representative of the employer have to sign the time sheets.

The university as the employer has the obligation to file the time sheets for 2 years. After that period, the time sheets shall be destructed.

The whole process is tedious and error-prone since the current solution (spreadsheets or paper forms) are inconvenient, students as well as staff easily miss to fill, print, sign, and archive the forms in a timely manner.

The TSS shall support the time sheet business. The supervisor and/or a secretary can enter contract data (name of supervisor, name of employee, duration and hours per week) for the student assistants. Employees can view their contracts.

The system keeps track of the hours due and the hours completed. To get an overview, a short description of the work content can be stored. An ideal solution would also support working hour reports via mobile devices.

The TSS shall provide basic statistics for supervisors as well as for employees.

For practical reasons, the frequency of printed reports should be configurable, e.g. once a week, or at the end of a month. The TSS shall send reminders by email in case of missing entries, missing reports, etc.

By the nature of the problem, the system records sensitive personal information that is subject to federal data protection acts. Wherever possible, the system shall employ technical measures to guarantee privacy and confidentiality (e.g. encrypted transfer) and ensure that only authorized people can access the data.

Prior to using the system, users have to give consent store their data, and confirm that they understand the regulations and the protection measures that protect their data.

Assumptions

It is assumed that the operating environment of the system servers is secured in a way that only trusted personnel can gain access to hardware, server software and databases.

However, the course participants are encouraged to spend some thoughts to possibilities to hide sensitive information even from the administrative staff (e.g. by encryption, pseudonymization, anonymization, etc.).

TSS REQUIREMENTS

GENERAL CONVENTIONS

TSS requirements contain an *obligation keyword*. This is one of:

- **SHALL** - denotes a mandatory requirement that has to be realized
- **SHOULD** - denotes an optional requirement that has a certain value - it may be skipped if serious obstacles impede the realization
- **WILL** - denotes an interface requirement that has to be taken into account but the realization of the functionality is outside of the system

Regarding the examination and grading of the course project, there is a minimum set of requirements that have to be realized to pass (grade 4.0 „ausreichend“). Those requirements are labeled with **MIN**.

USE CASES AND ROLES

Roles

Employee

An employee can be a student or a university staff member.

Supervisor

A supervisor is a university staff member. The supervisor is the contractual boss of an employee. Supervisors have to sign the time sheets prior to archiving.

Assistant

An assistant is a university staff member. Assistants are responsible for the concrete tasks assigned to employees. Assistants may as well manage contracts in the TSS.

Secretary

A secretary is a university staff member. Secretaries are responsible for printing the time sheets. They forward the time sheets to the supervisor in order to sign them. Secretaries are also responsible for archiving the signed time sheets.

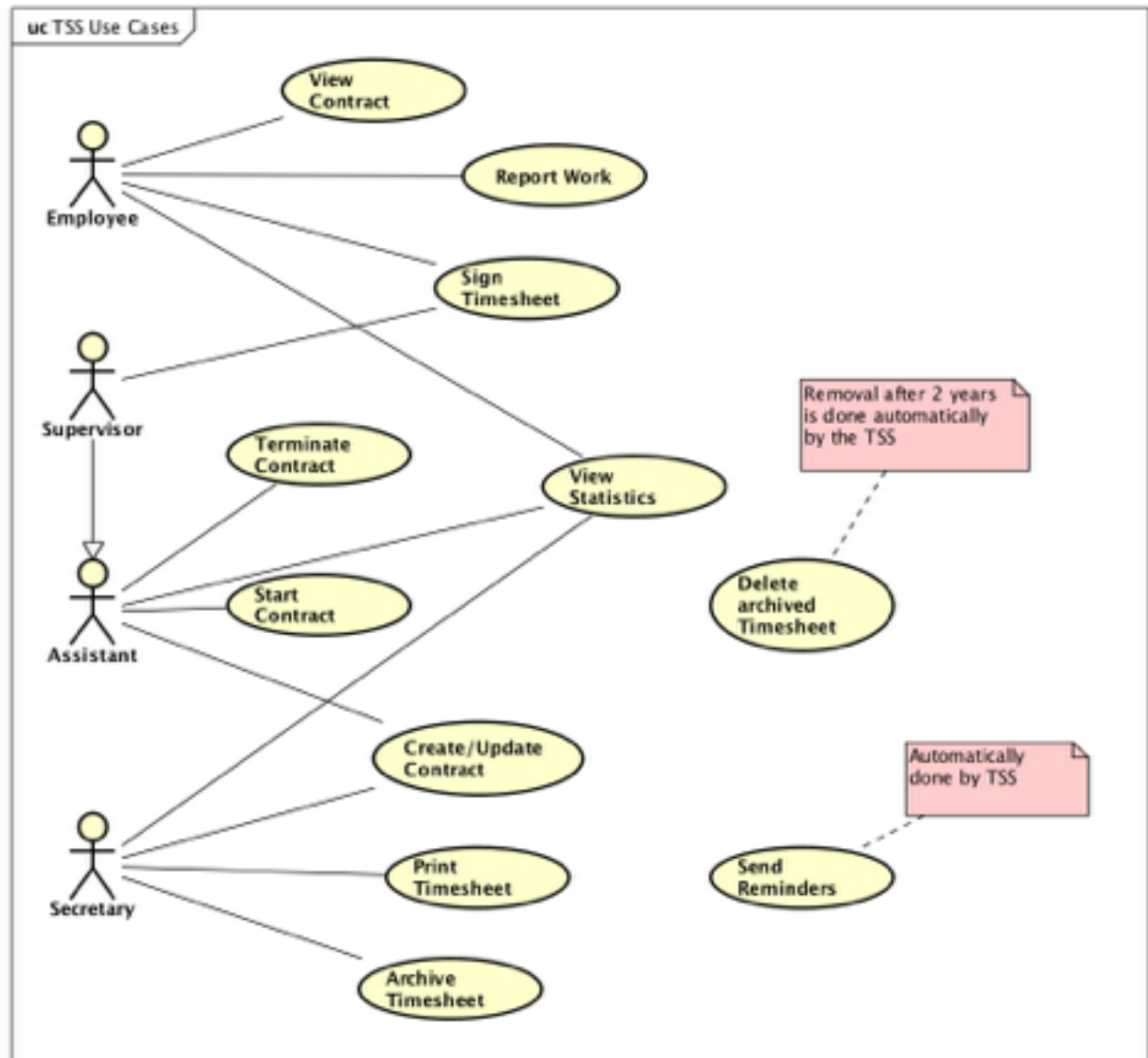
Guest

Guests may only view public information and documentation about the TSS.

Administrator

An Administrator is a university staff member. Administrators are responsible to install, configure, and operate the TSS. As TSS users, they may get additional responsibilities, e.g. deleting contracts of former employees or database management tasks.

Use Cases



FUNCTIONAL REQUIREMENTS

Contracts

- CN1 **MIN** The TSS **SHALL** provide assistants and supervisors with the ability to manage contracts. Manage means „CRUD“ (Create, Read, Update, Delete). Update and deletion of contracts is only possible in state PREPARED.
- CN2 The TSS **SHALL** provide secretaries with the ability to print contracts. This printout is intended to be used as cover page for the paper archive of the printed time sheets.
- CN3 **MIN** The TSS **SHALL** provide employees, assistants, supervisors, and secretaries with the ability to view contract statistics (e.g. sum of hours due, balance).
- CN4 **MIN** The TSS **SHALL** calculate the total hours due, the vacation hours, the remaining hours due and take into account weekends and public holidays.
- CN4a **MIN** The TSS **SHALL** calculate the vacation hours by the following formula:

$$\text{vacationHours} = \text{vacationDaysPerYear} * \text{durationOfContract} / 12 * \text{hoursPerWeek} / \text{workingDaysPerWeek}$$

The duration of the contract is counted in months.

- CN4b **MIN** The TSS **SHALL** calculate the total hours due for the contract as the sum of the hours due of the individual Timesheets.
- CN4c **MIN** The TSS **SHALL** calculate the hours due for a Timesheet by the following formula:

$$\text{hoursDue} = (\text{workingDaysInPeriod} - \text{publicHolidaysInPeriod}) * \text{hoursPerWeek} / \text{workingDaysPerWeek}$$

The period can be a week or a month, depending on the TimesheetFrequency of the contract.

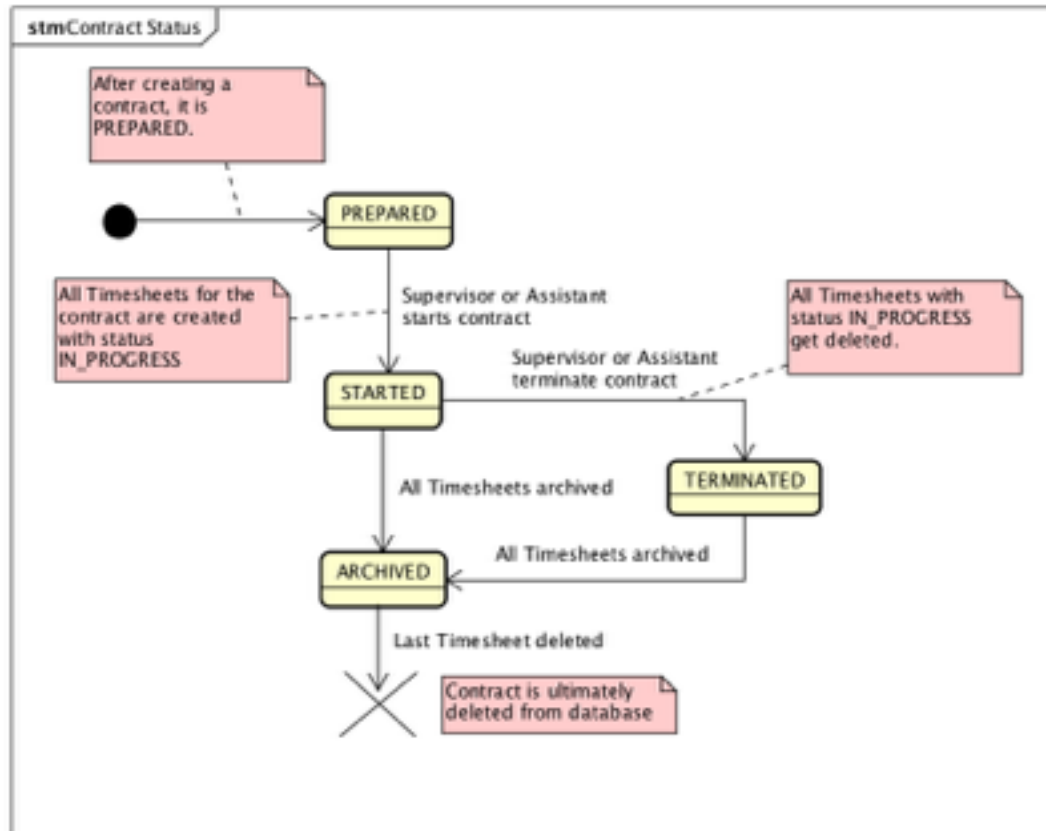
E.g., if workingDaysPerWeek = 5, Monday to Friday count as working days, Saturday and Sunday as non-working days.

Only public holidays have to be counted that are on working days.

- CN4d **MIN** The TSS **SHALL** be able to determine the public holidays in Rhineland-Palatinate starting from January 01 2018 until December 31 2028 (at least).
- CN4e The TSS **SHALL** be able to determine the public holidays in Germany from January 01 2018 until December 31 2028 (at least).
Then, the federal state must be configurable since there are different regulations for public holidays in the various parts of the country.

- CN5 MIN The TSS **SHALL** set a contract to PREPARED status as soon as it is created.
- CN6 MIN The TSS **SHALL** ensure that start date, end date, frequency, hours per week, vacation hours, working days per week, and vacation days per year can only be changed when the contract is in PREPARED status.
- CN6a The TSS **SHALL** ensure that start date and end date of a contract always denote complete months (i.e. the start date must be the first day of a month, the end date the last day).
- CN7 MIN The TSS **SHALL** provide assistants and supervisors with the ability to start a contract. Then, the contract changes from PREPARED to STARTED status. All Timesheets are created in status IN_PROGRESS.
- CN8 The TSS **SHALL** provide assistants and supervisors with the ability to terminate a started contract. Then, the contract changes from STARTED to ABORTED status.
- CN9 MIN The TSS **SHALL** ensure that only contracts can be aborted whose time sheets are in status SIGNED_BY_SUPERVISOR or IN_PROGRESS.
- CN10 The TSS **SHALL** record the date of termination of a contract.
- CN11 Before terminating a contract, the TSS **SHOULD** warn the user if there are time sheets in state IN_PROGRESS that have entries. The user may then decide to not terminate the contract yet.
- CN12 MIN The TSS **SHALL** set a contract to status ARCHIVED as soon as all time sheets of that contract are in status ARCHIVED.

Contract State Diagram

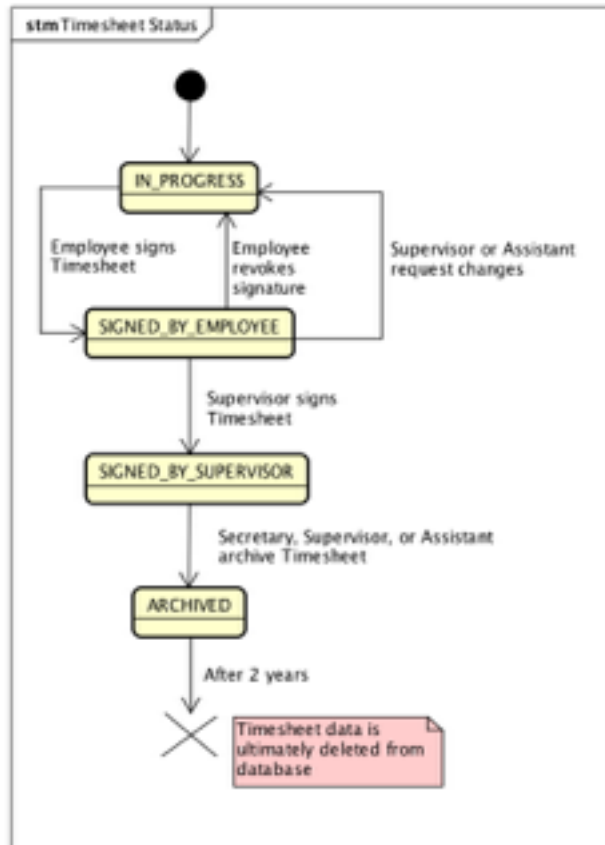


Time Sheets

- TS1 **MIN** The TSS **SHALL** create all time sheets for a contract based on the time sheet frequency and the start and end dates of the contract as soon as the contract enters the STARTED status.
- TS2 **MIN** The TSS **SHALL** ensure that time sheet entries can only be added, changed, and removed when the time sheet is in IN_PROGRESS status and the contract of the time sheet is in STARTED status.
- TS3 **MIN** The TSS **SHALL** ensure that the total hours reported in entries of type VACATION can not exceed the total vacation hours (see requirement CN4a).
- TS4 The TSS **SHALL** delete time sheets in status IN_PROGRESS as soon as the contract status changes to TERMINATED.
- TS5 **MIN** The TSS **SHALL** not delete time sheets that are in the SIGNED_BY_EMPLOYEE state.
- TS6 **MIN** The TSS **SHALL** not delete time sheets that are in the SIGNED_BY_SUPERVISOR state.
- TS7 **MIN** The TSS **SHALL** provide employees, assistants, supervisors, and secretaries with the ability to view time sheets.
- TS8 The TSS **SHALL** provide secretaries with the ability to print time sheets.
- TS9 **MIN** The TSS **SHALL** provide employees with the ability to manage their time sheet entries. Changes to entries are only allowed when a Timesheet is IN_PROGRESS.

Signatures

- SG1 **MIN** The TSS **SHALL** provide employees with the ability to sign a time sheet. Then, the time sheet changes from IN_PROGRESS to SIGNED_BY_EMPLOYEE status.
- SG1a The TSS **SHALL** provide employees with the ability to revoke the signature. Then, the time sheet changes from SIGNED_BY_EMPLOYEE to IN_PROGRESS status.
- SG2 **MIN** The TSS **SHALL** provide supervisors with the ability to sign a time sheet that is in status SIGNED_BY_EMPLOYEE. Then, the time sheet changes to SIGNED_BY_SUPERVISOR status.
- SG3 The TSS **SHALL** provide assistants and supervisors with the ability to request changes to a time sheet that is in status SIGNED_BY_EMPLOYEE. Then, the time sheet changes to IN_PROGRESS status.
- SG4 The TSS **SHOULD** provide employees and supervisors with the ability to digitally sign the time sheets.

Time Sheet State Diagram

Reminders

- RE1 **MIN** On the last day of a time sheet (either end of week or end of month), the TSS **SHALL** send a reminder mail to the employee if the time sheet is in state IN_PROGRESS.
- RE2 The TSS **SHALL** send a reminder mail to the supervisor and the assistants if the time sheet is in state SIGNED_BY_EMPLOYEE. (then, the supervisor may reject or sign the time sheet)
- RE3 The TSS **SHALL** send a reminder mail to the secretaries if the time sheet is in state SIGNED_BY_SUPERVISOR.
- RE4 The TSS **SHALL** repeat reminders every day.
- RE5 The TSS **SHOULD** collect all reminders so that a person receives at most one e-mail per day.

Archiving

- AR1 **MIN** The TSS **SHALL** provide secretaries with the ability to archive time sheets that are in status SIGNED_BY_SUPERVISOR. Then, the time sheet changes to status ARCHIVED.
- AR2 **MIN** The TSS **SHALL** ensure that archived time sheets can not be changed.
- AR3 The TSS **SHALL** delete time sheets 2 years after the signature of the supervisor. When all time sheets of a contract are deleted, the contract has to be deleted as well.
- AR4 The TSS **SHOULD** support variable archive durations. In this case, the 2 years duration is not fixed, but must be stored per contract. The duration should have a default value of 2 years.

NON-FUNCTIONAL REQUIREMENTS**Access Control**

- AC1 **MIN** The TSS **SHALL** authenticate users prior to giving access to any data.
- AC2 The TSS **SHALL** be able to determine whether a person is university staff member.
- AC3 **MIN** The TSS **SHALL** be designed in a way that only authorized users may view/change/delete data. Access rules are based on the users affiliation (staff, student) as well as on the roles a user owns with respect to a contract.

User Interface

- UI1 **MIN** The TSS **SHALL** be designed in a way that the most frequent task (report work) is accessible immediately after successful login.
- UI2 The TSS **SHOULD** support mobile devices.
- UI3 The TSS **SHALL** be designed such that it can be used with different browsers. At least, FireFox, Safari, Chrome should be supported.
- UI4 The TSS **SHOULD** use the Bootstrap CSS library.

Internationalization

- IN1 **MIN** The TSS **SHALL** be designed such that the user interface language can be switched.
- IN2 The TSS **SHALL** provide the users to choose their language.
- IN3 The TSS **SHALL** support at least two user interface languages.
- IN4 **MIN** The TSS **SHALL** support English as user interface language.
- IN5 The TSS **SHALL** support German as user interface language.
- IN6 The TSS **SHOULD** send reminders to users in their preferred language.

Software Architecture

- SA1 **MIN** The TSS **SHALL** be implemented according to the layered architecture (see tss-architecture document).
- SA2 **MIN** The TSS **SHALL** contain (at least) two modules, the web module and the EJB module.
- SA3 **MIN** The TSS team **SHALL** ask for consent prior to using third-party libraries that were not presented in the lecture/lab. Usage is permitted only after negotiation with the customer.
- SA4 **MIN** The TSS **SHALL** use one of the database servers MySQL (preferred), PostgreSQL, or JavaDB/Derby.
- SA5 **MIN** The project team **SHALL** document architectural decisions, e.g. which subsystems do exist, how is the source code structured, etc. in the project manual.
- SA6 **MIN** The project team **SHALL** prefix all global names with its team name. Such names are e.g. project name, context path (root URL), database name, persistence units, server resources, etc.
This is to avoid naming conflicts, since the customer has to install the systems of many teams side-by-side.

Project Manual

- PM1 MIN The TSS **SHALL** be documented in a project manual (can be online, e.g. Wiki) such that the customer can install the system on a fresh Payara server.
- PM2 MIN The project manual **SHALL** contain a list of completed/missed requirements.
- PM3 MIN The project manual **SHOULD** contain descriptions of problems that occurred during the implementation and their solutions.
- PM4 MIN Decisions made to detail and/or change requirements **SHALL** be documented in the project manual.
- PM5 The project participants **SHOULD** record the time spent on the project.