Software Architecture Document (SAD)

Project: NRG16

8.10.14

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1. Introduction and Goals

Program to visualize and monitor electrical energy consumption of a standard EFH.

Manually entering data of electric meter I + II and operating hours of Solar pump.

The program will present different statistics of archived data (example : Month Average kWh).

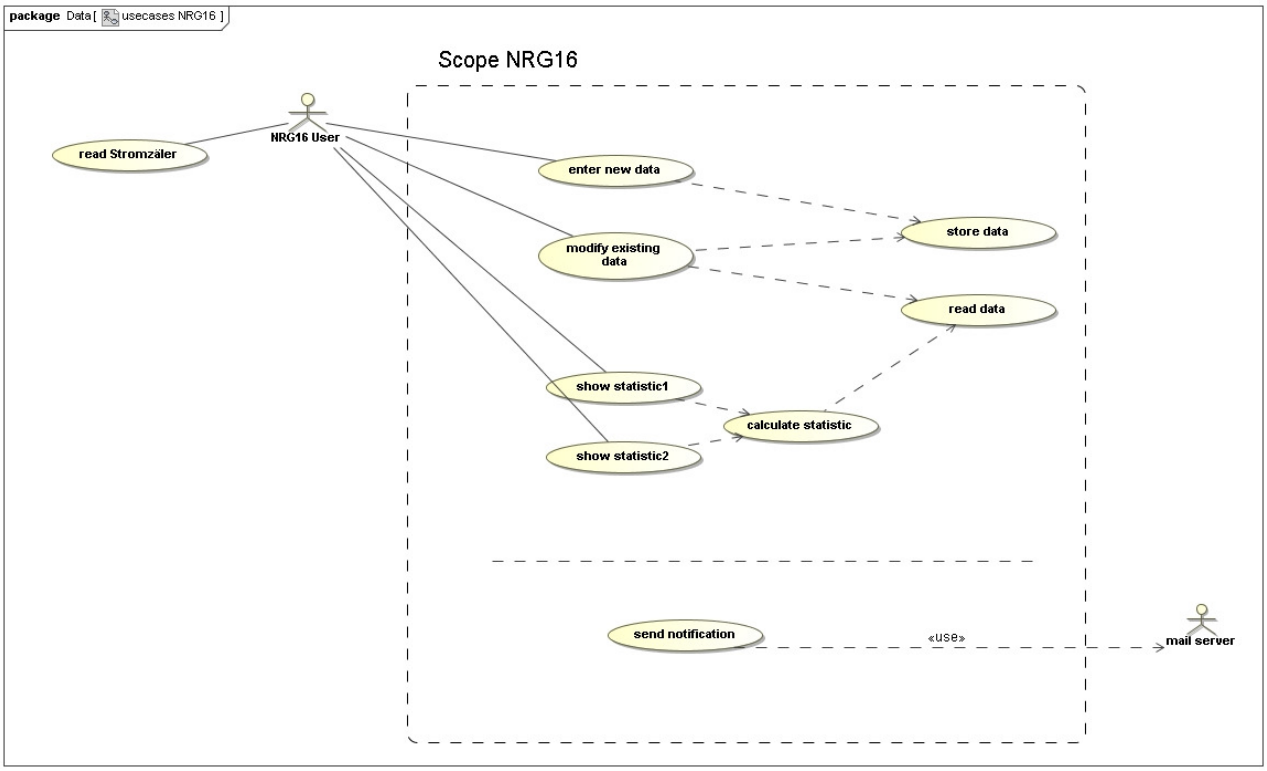
NRG16 will be designed to run on a Desktop PC, a Web Browser or on a Mobile App.

2. Constraints

- Java-Swing Version 8 for Desktop
- Excel Sheet for persistency
- Maven for build process
- Git for version control

3. Context View

Context and Usescases NRG16:

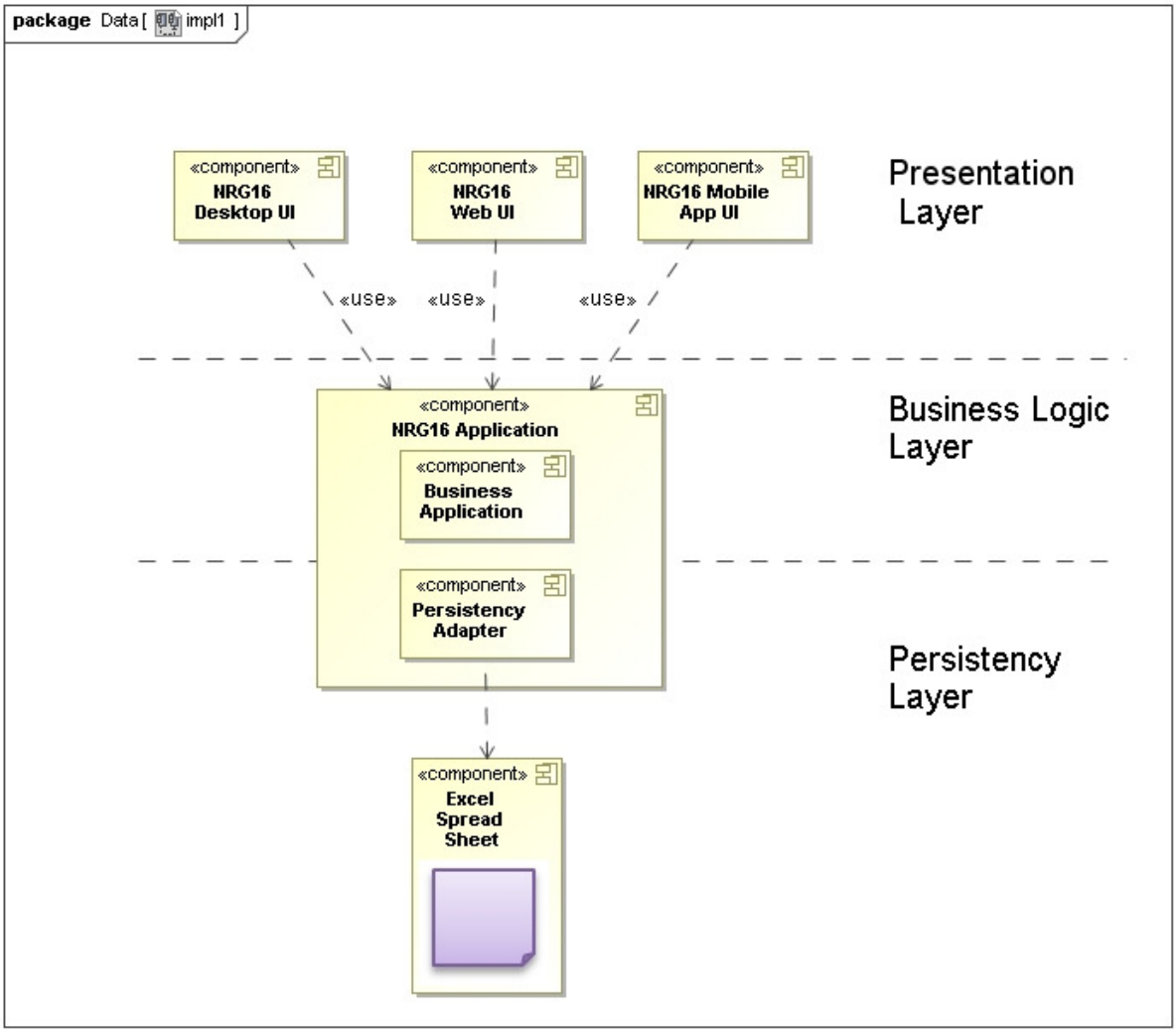


Note: it is not the scope of NRG16 to read automatically the different electric meters. Instead it is the task of the user to enter manually the specific data.

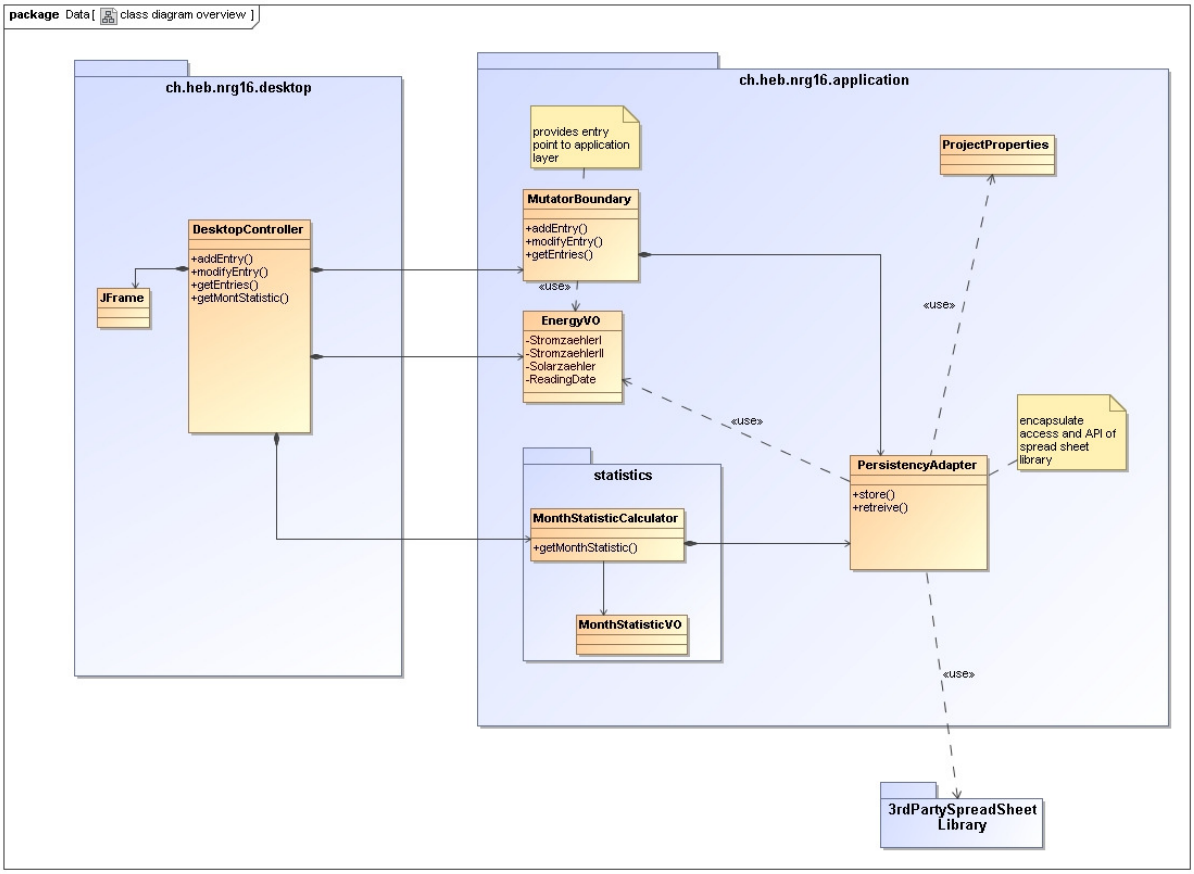
Only 1 user role of NRG16 user is needed.

4. Building Block View

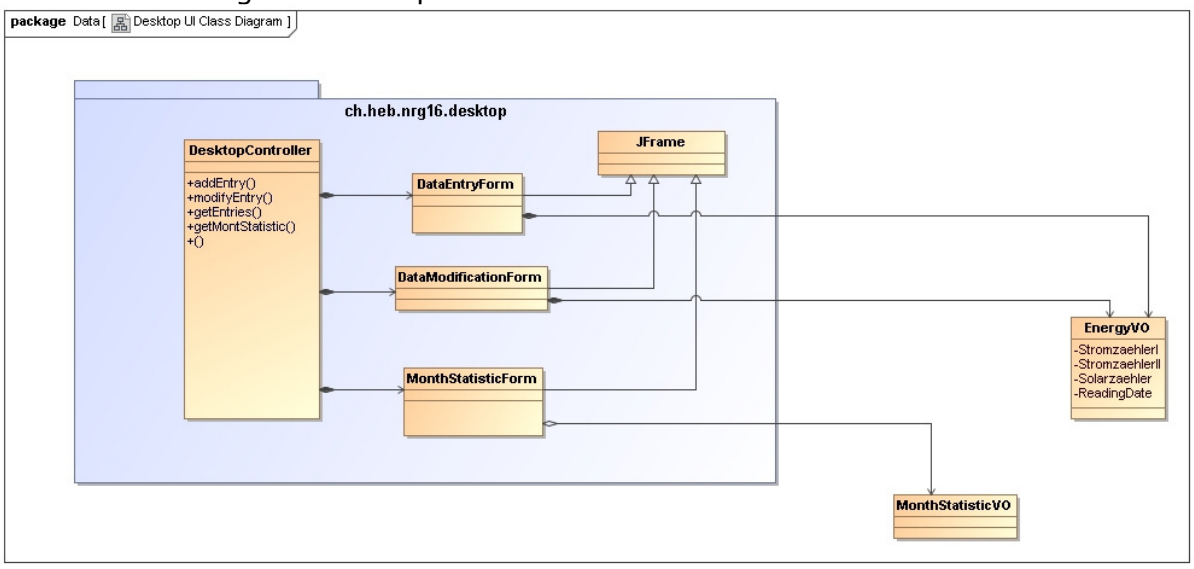
NRG16 will be structured into 3 layers.
Each UI technique has its own component (java jar) .
Business Logic and Persistency Adapter are within 1 component (NRG16 Application)


package Data [impl1]
«component»
NRG16
Desktop UI
«component»
NRG16
Web UI
«component»
NRG16 Mobile
App UI
Presentation
Layer
«use»
«use»
«use»
«component»
NRG16 Application
«component»
Business
Application
«component»
Persistency
Adapter
Business Logic
Layer
Persistency
Layer
«component»
Excel
Spread
Sheet

NRG16 Class Diagram Overview:

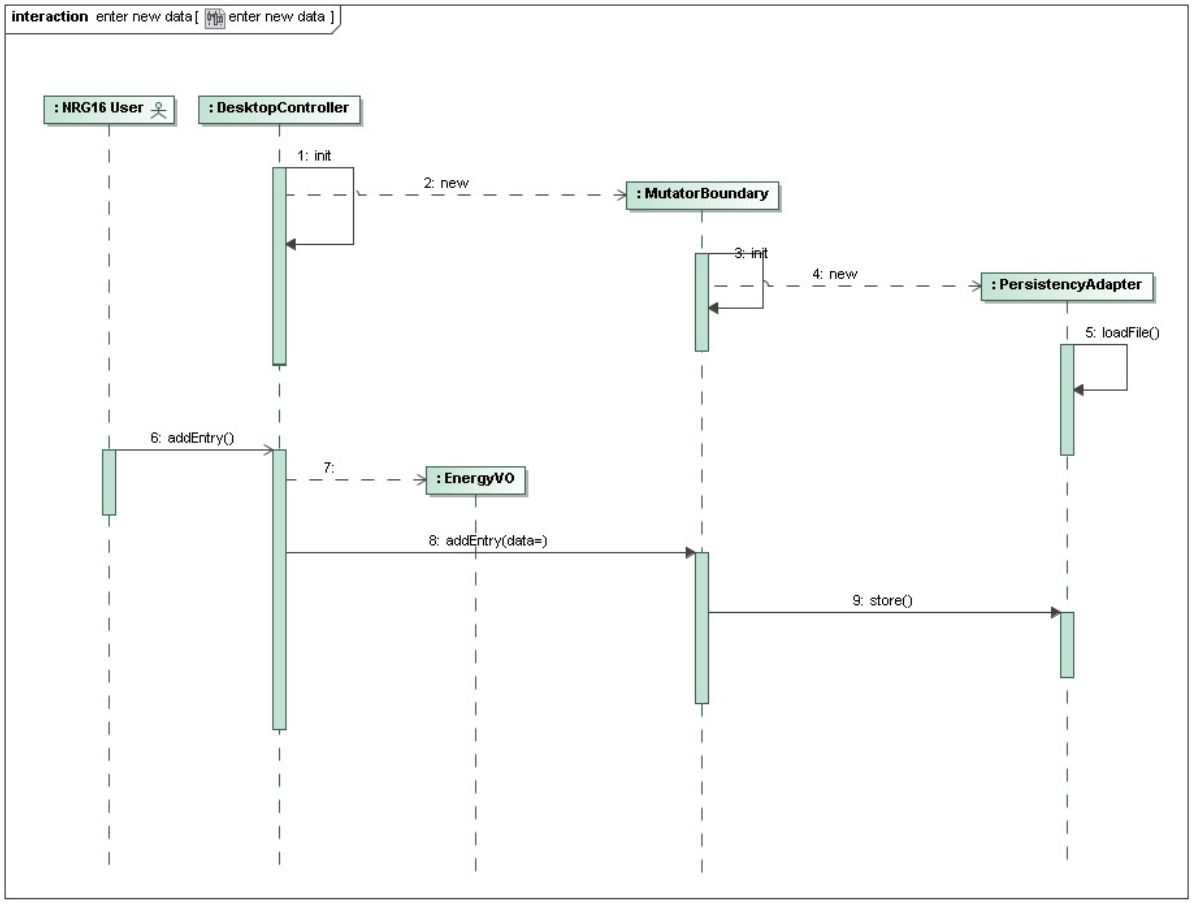


NRG16 Class Diagram Desktop UI:



5. Runtime View

5.1 Sequence Diagram : User manually entering new data



5.2 Sequence Diagram : modification of existing data

tbd

5.3 Sequence Diagram : show month statistic

tbd

5.4 Sequence Diagram : send user notification

tbd

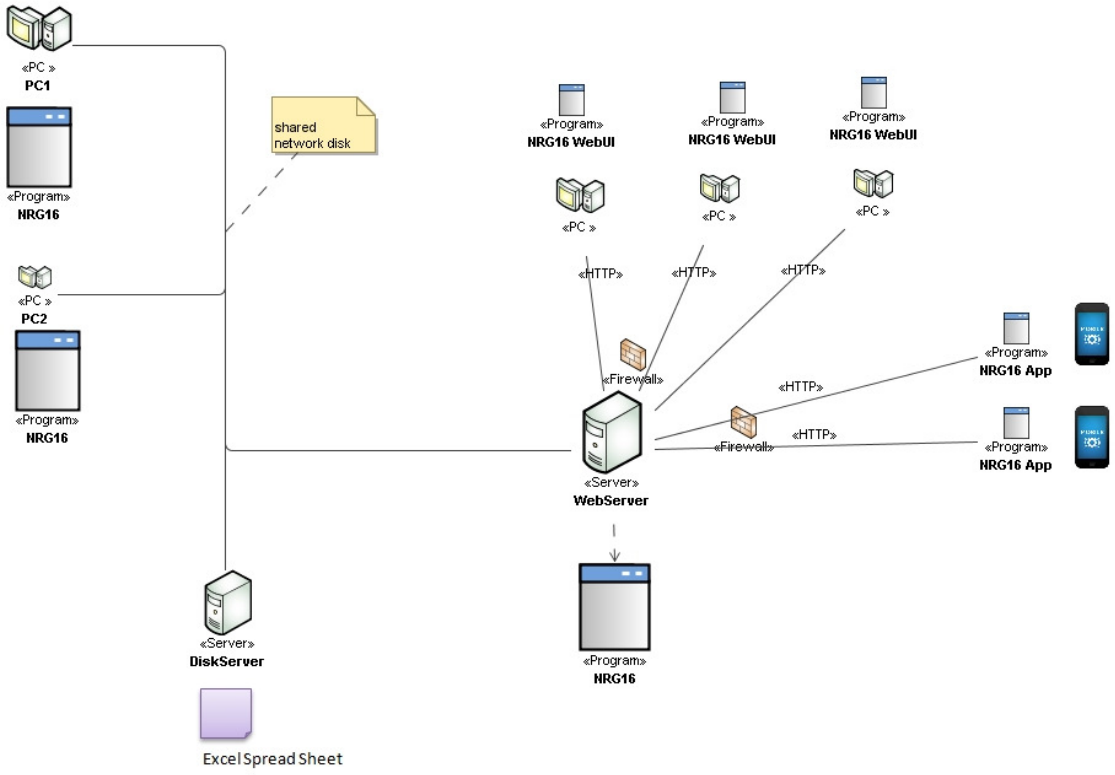
6. Deployment View

NRG16 is designed to be deployable in 3 different environments:

- Desktop with access to spread sheet via shared disk

- WebBrowser with HTPP access to WebServer
- Mobile App with HTPP access to WebServer

Java and WebServer are required infrastructure.
As a desktop application it is foreseen to start the application multiple times. A shared network directory will persist the data on a unique place.
If the application runs as a Web Application the Web Server will share the same files.



7. Architecture Aspects

7.1 Persistency

Data will be persistent in a Spread Sheet (MS Excel).

Example :

	A	B	C	D	E	F	G	H	Q	R	S
		I	Total I	II	Total II	Total I+II	Tage	E pro Tag	Solar Zähler	Solar Total	Solar/Tag
2	Datum	kWh	kWh	kWh	kWh	kWh	Anzahl	kWh/Tg	h	h	h
04	13.11.2013	71385	121	112052	206	327	12	27			
05	01.12.2013	71730	345	112521	469	814	18	45	9783	22.56	0.8
06	04.12.2013	71788	58	112599	78	136	3	45	9785.52	2.26	0.8
07	31.12.2013	72387	599	113379	780	1379	27	51	9805	19.04	0.7
08	02.01.2014	72431	44	113437	58	102	2	51	9805.97	1.41	0.7
09	01.02.2014	73059	628	114231	794	1422	29	49	9824.66	18.69	0.6
10	01.03.2014	73552	493	114909	678	1171	28	42	9873.15	48.49	1.7
11	01.04.2014	73946	394	115569	660	1054	30	35	10020.91	147.76	4.9
12	01.05.2014	74259	313	116079	510	823	30	27	10172	151.56	5.1
13	04.05.2014	74290	31	116130	51	82	3	27	10187.63	15.16	5.1

Apache POI is a 3rd party library to read/write Excel sheets [http://poi.apache.org/] .

7.2 User Interface

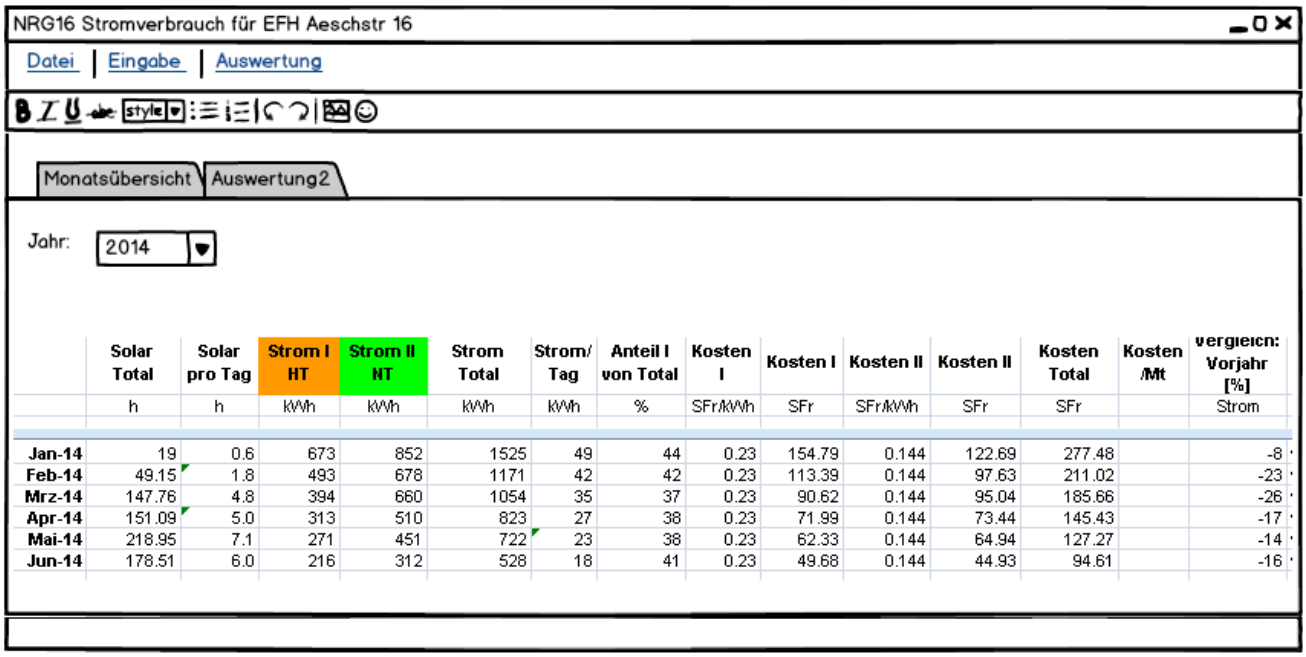
NRG16 is designed to support different UIs:

- Desktop application using Java Swing
- Browser application using Browser and WebServer
- Mobile App using Android (Apple iOS tbd)

Desktop UI

Main Window

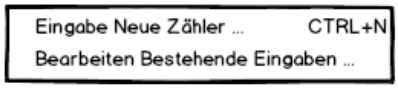
The NRG16 Main Window will present the first statistical calculation of the energy consumption . Other statistical calculations can be selected.



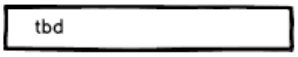
	Solar Total	Solar pro Tag	Strom I HT	Strom II NT	Strom Total	Strom/ Tag	Anteil I von Total	Kosten I	Kosten I	Kosten II	Kosten II	Kosten Total	Kosten /Mt	vergleich: Vorjahr [%]
	h	h	kWh	kWh	kWh	kWh	%	SFr/kWh	SFr	SFr/kWh	SFr	SFr		Strom
Jan-14	19	0.6	673	852	1525	49	44	0.23	154.79	0.144	122.69	277.48		-8
Feb-14	49.15	1.8	493	678	1171	42	42	0.23	113.39	0.144	97.63	211.02		-23
Mrz-14	147.76	4.8	394	660	1054	35	37	0.23	90.62	0.144	95.04	185.66		-26
Apr-14	151.09	5.0	313	510	823	27	38	0.23	71.99	0.144	73.44	145.43		-17
Mai-14	218.95	7.1	271	451	722	23	38	0.23	62.33	0.144	64.94	127.27		-14
Jun-14	178.51	6.0	216	312	528	18	41	0.23	49.68	0.144	44.93	94.61		-16

Menu Datei:

Menu Eingabe:



Menu Auswertung:

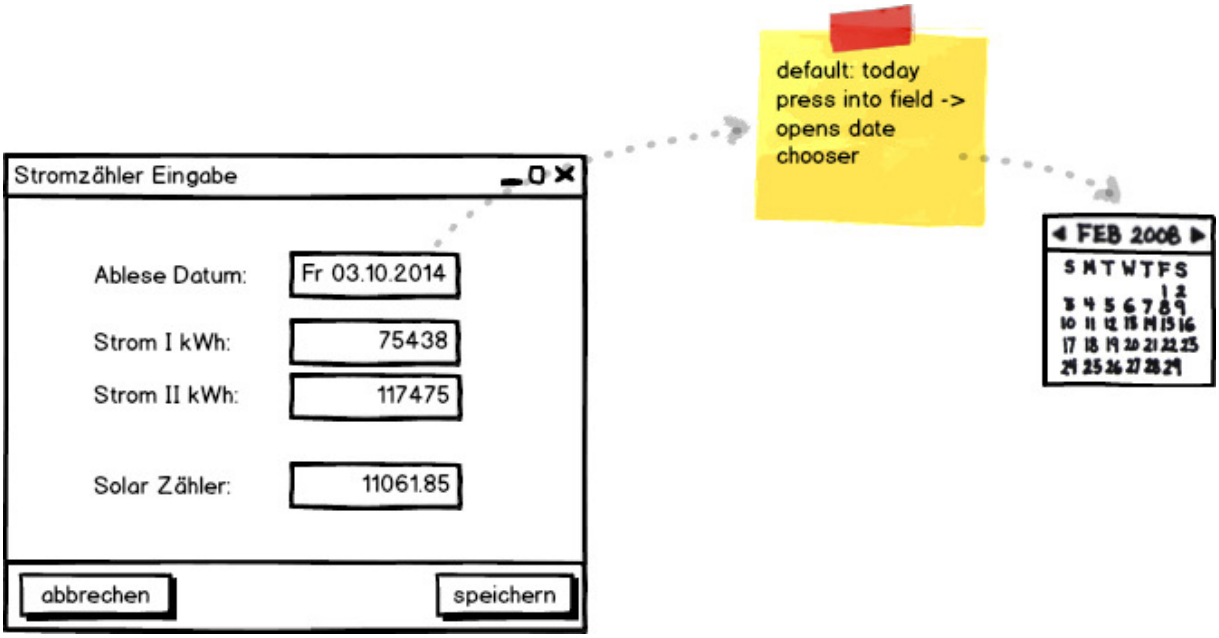


Project Properties

With opening a NEW Project the user has to enter the following properties :

- Project Name : ex. 'EFH Aeschstr 16'
- Email address for notification
- Opening Date (set by System to today)
- Kosten Stromtarif I : ex. 8 Rp.
- Kosten Stromtarif II : ex. 15 Rp.
- Path to spread sheet file

Adding new data with DataEntryForm:

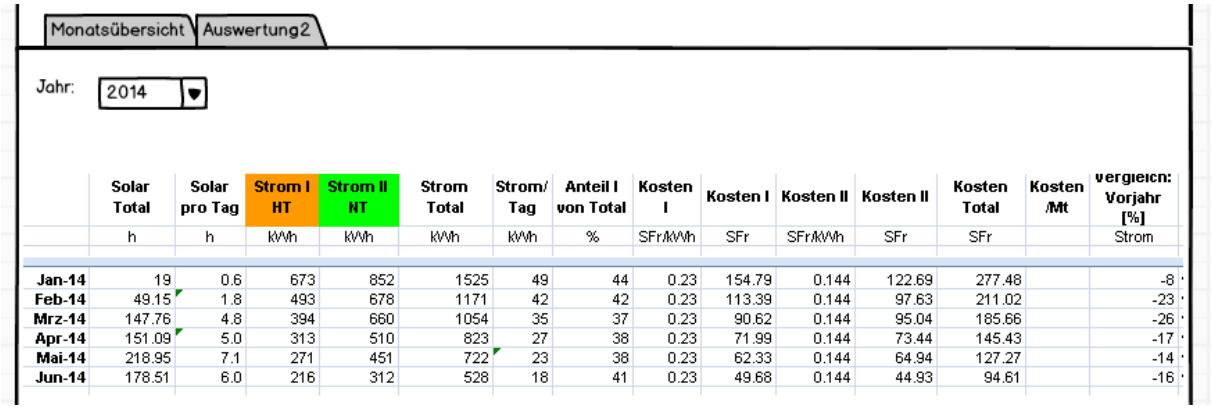


Modifing existing data with DataModificationForm:

		I	Total I	II	Total II	Total I+II	Tage	E pro Tag	Solar Zähler	Solar Total	Solar/Tag
2	Datum	kWh	kWh	kWh	kWh	kWh	Anzahl	kWh/Tg	h	h	h
395	30.04.2013	69756	386	109549	601	987	30	33	8885.37	119.89	4.0
396	31.05.2013	70086	330	110060	511	841	30	28	9064.19	178.82	6.0
397	30.06.2013	70320	234	110457	397	631	30	21	9247.43	183.24	6.1
398	01.08.2013	70442	122	110628	171	293	31	9	9385	137.89	4.4
399	08.08.2013	70469	27	110667	39	66	7	9	9416.46	31.14	4.4
400	01.09.2013	70629	160	110937	270	430	23	19	9530	113.22	4.9
401	09.09.2013	70684	55	111031	94	149	8	19	9569.06	39.38	4.9
402	30.09.2013	70894	210	111331	300	510	21	24	9671.04	101.98	4.9

Statistics

Auswertung1 : Monatsübersicht
A combobox allows to filter to a specific year. –ALL- is still possible, showing all available months.



Monatsübersicht | Auswertung2

Jahr: 2014

	Solar Total	Solar pro Tag	Strom I HT	Strom II NT	Strom Total	Strom/ Tag	Anteil I von Total	Kosten I	Kosten I	Kosten II	Kosten II	Kosten Total	Kosten /Mt	vergleich: Vorjahr [%]
	h	h	kWh	kWh	kWh	kWh	%	SFr/kWh	SFr	SFr/kWh	SFr	SFr		Strom
Jan-14	19	0.6	673	852	1525	49	44	0.23	154.79	0.144	122.69	277.48		-8
Feb-14	49.15	1.8	493	678	1171	42	42	0.23	113.39	0.144	97.63	211.02		-23
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Apr-14	151.09	5.0	313	510	823	27	38	0.23	71.99	0.144	73.44	145.43		-17
Mai-14	218.95	7.1	271	451	722	23	38	0.23	62.33	0.144	64.94	127.27		-14
Jun-14	178.51	6.0	216	312	528	18	41	0.23	49.68	0.144	44.93	94.61		-16

Auswertung2
tbd

7.4 Transactions

There is no Database foreseen. Therefore the Application has to implement adequate means to prevent data loss due to parallel modifications of data in the spread sheet by several users.

7.5 Session Management

A user session is only needed for Web and Mobile App environment.

7.6 Security

A user registration with username password may be needed in Web and Mobile App environment

7.7 Integration with other IT-Systems

For user notifications a mail server has to be integrated (SMTP).

7.8 Deployment

NRG16 is build upon several Java jar's:

- ch.heb.nrg16.desktop.jar
- ch.heb.nrg16.application.jar

See also Deployment View.

7.9 Error and Exception Handling

See Dev Guideline

7.10 Audit, Logging, Tracing

Only logging with Log4j is foreseen.

7.11 Configuration Management

The project properties can be persist either in Spread Sheet or in separate property file.

7.12 Threading and Concurrency

The application supports multi-threading

7.13 Internationalisation

UI text data has to be externalized, even though only German is foreseen.

7.18 Build-Management

The project will be build via Maven.
Version Control via GitHub.

8. Appendices

8.1 Appendix A Detail Requirements

At least 1 complete electric meter dataset should be entered per month.

If the next entry is overdue , a user notification via email should be sent and the UI status bar shows an corresponding message.

Calculation Month Average:
Linear interpolation is used between several data entries.

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