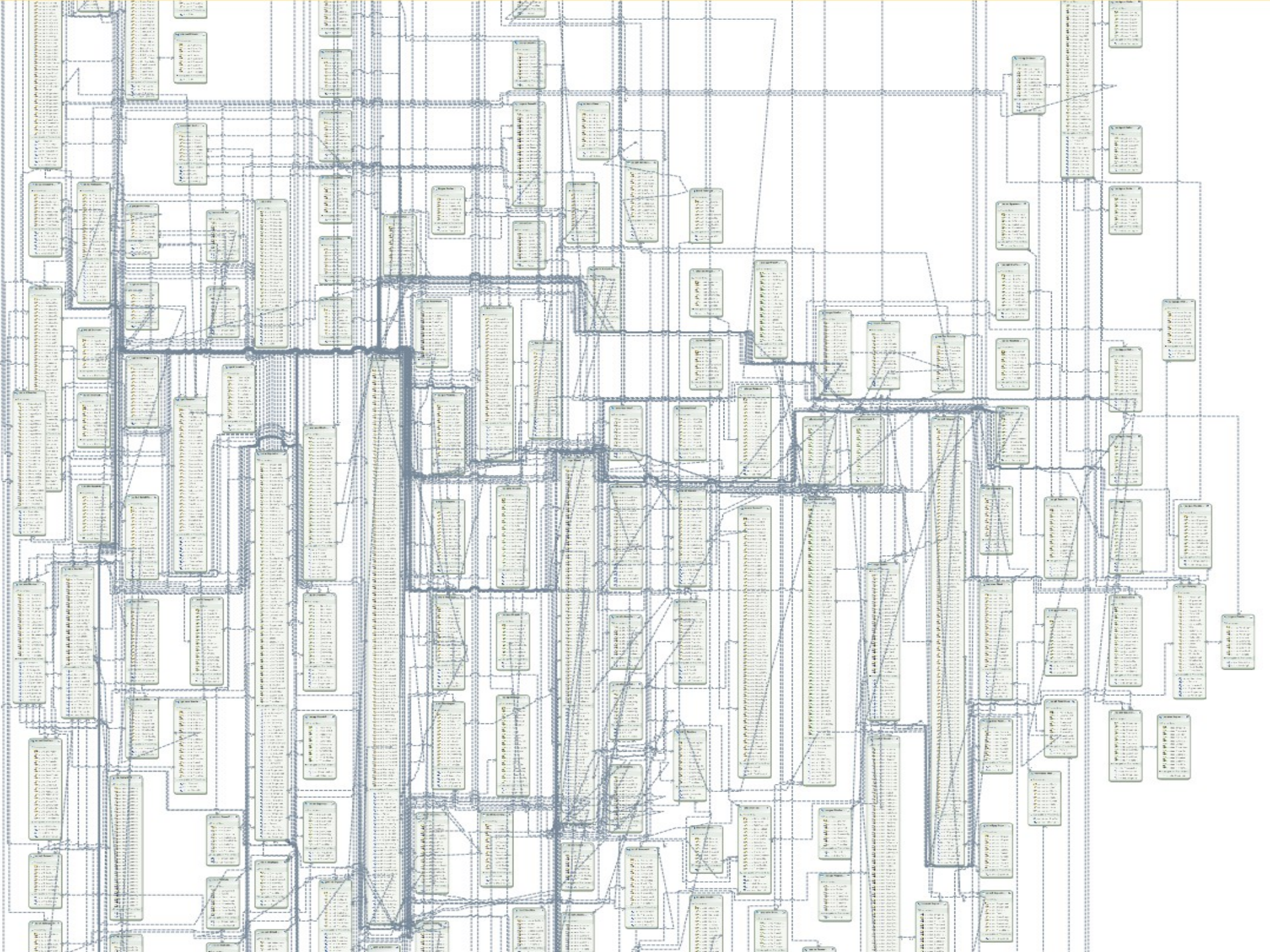
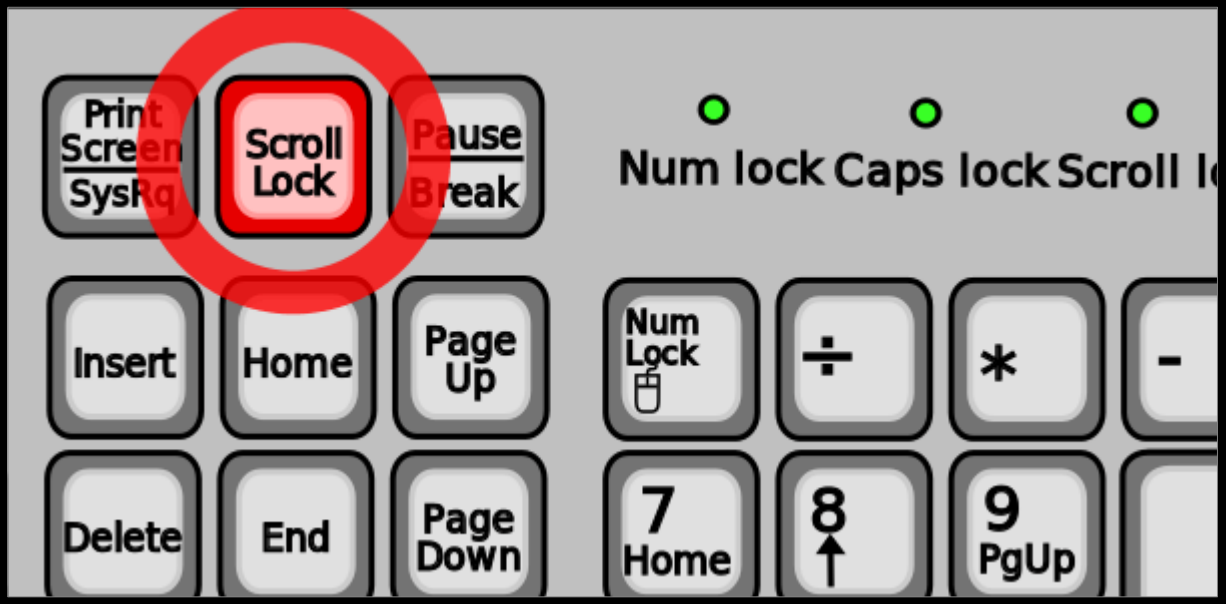
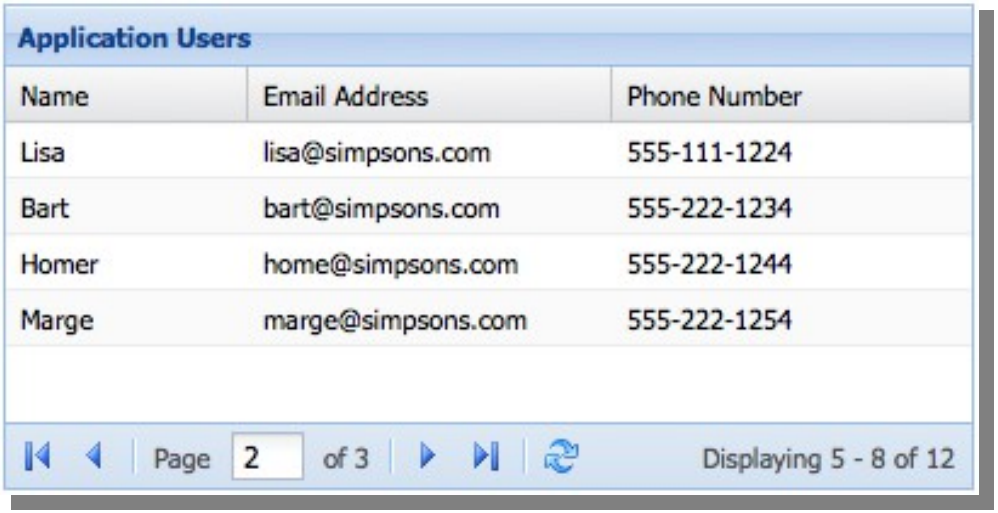
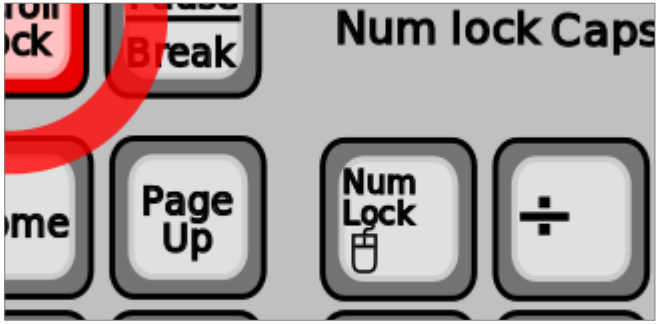
Buffered Store Internals ExtJS 6




000000
TIME014
Moon
Patrol
©1982 IREM CORP.


Print Screen
SysRq
Scroll Lock
Pause Break
Num lock
Caps lock
Insert
Home
Page Up
Num Lock
÷
*
-
Delete
End
Page Down
7 Home
8
9 PgUp

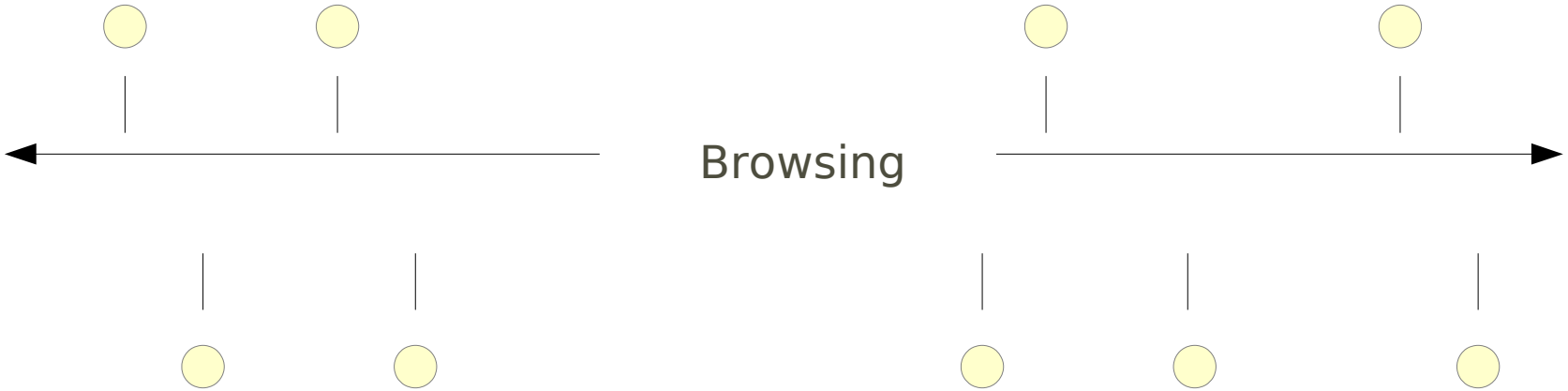

Application Users
Name
Email Address
Phone Number
Lisa
lisa@simpsons.com
555-111-1224
Bart
bart@simpsons.com
555-222-1234
Homer
home@simpsons.com
555-222-1244
Marge
marge@simpsons.com
555-222-1254
Page
2
of 3
Displaying 5 - 8 of 12



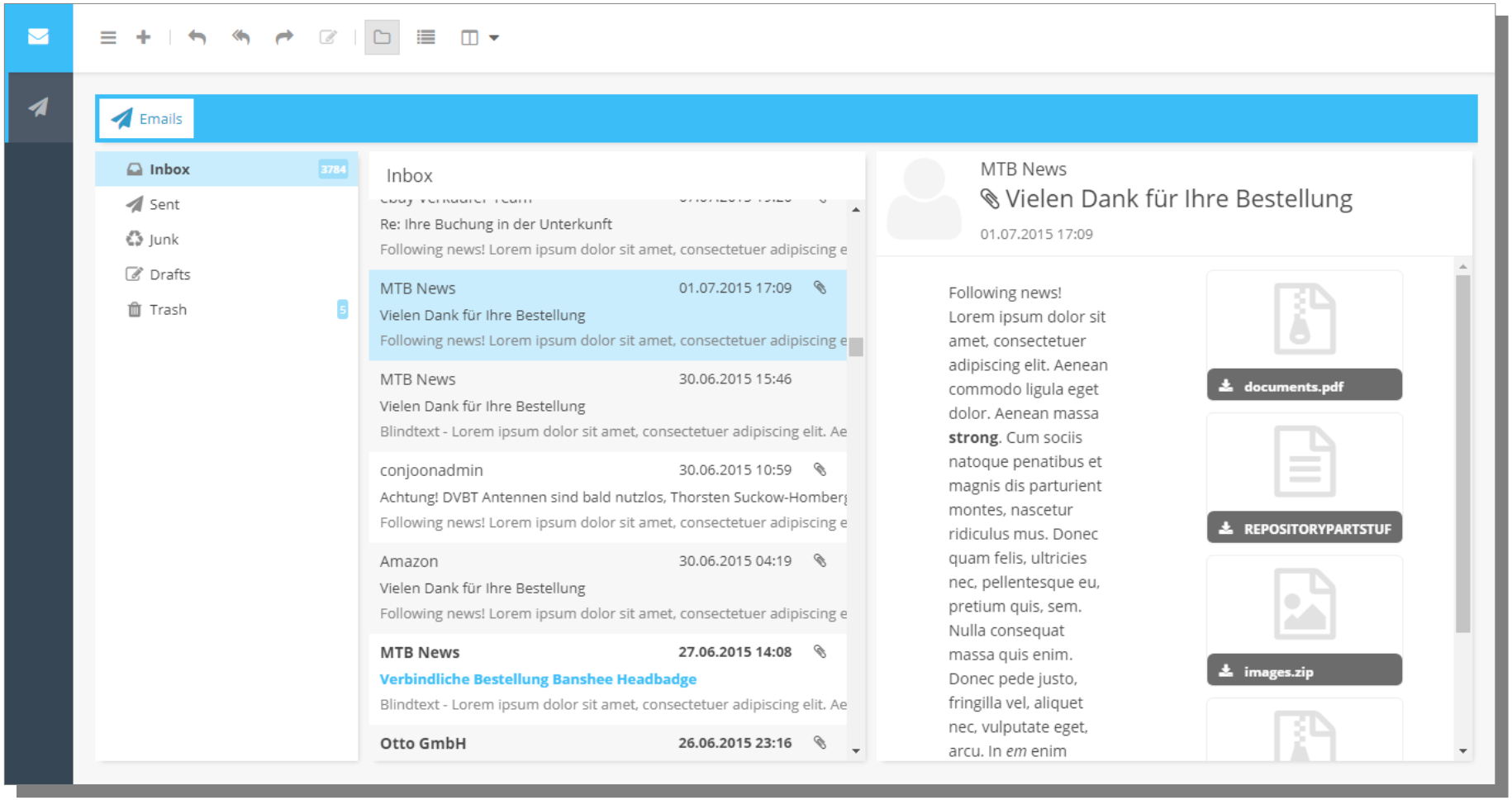
Application Users

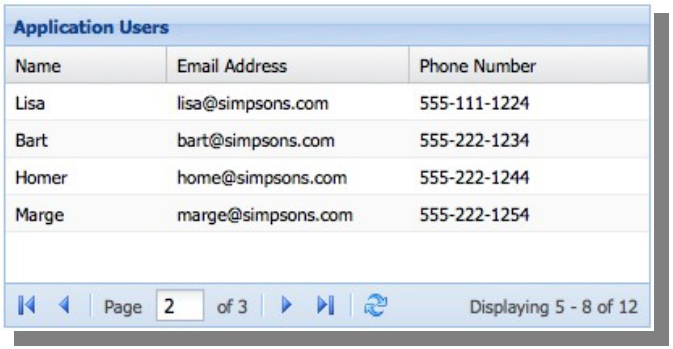
Name	Email Address	Phone Number
Lisa	lisa@simpsons.com	555-111-1224
Bart	bart@simpsons.com	555-222-1234
Homer	home@simpsons.com	555-222-1244
Marge	marge@simpsons.com	555-222-1254

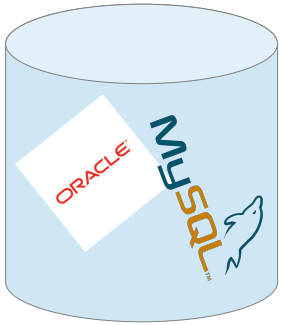
Page 2 of 3 Displaying 5 - 8 of 12



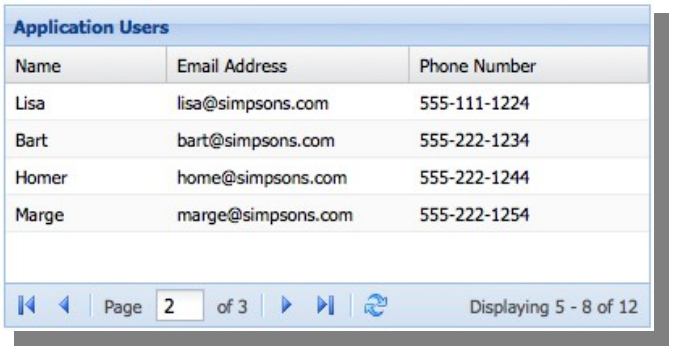
= Information

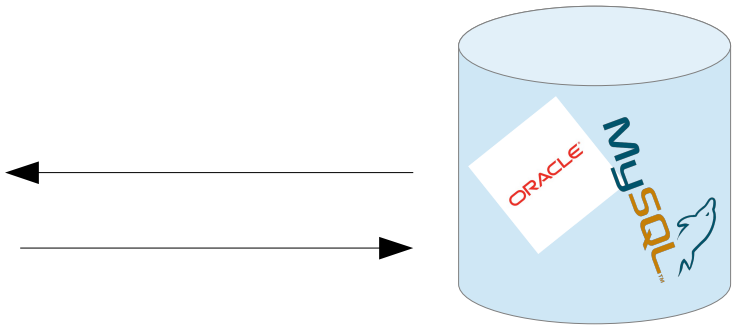

Emails
Inbox 3784
Sent
Junk
Drafts
Trash 5
Inbox
Re: Ihre Buchung in der Unterkunft
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing e
MTB News 01.07.2015 17:09
Vielen Dank für Ihre Bestellung
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing e
MTB News 30.06.2015 15:46
Vielen Dank für Ihre Bestellung
Blindtext - Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ae
conjoonadmin 30.06.2015 10:59
Achtung! DVBT Antennen sind bald nutzlos, Thorsten Suckow-Homberg
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing e
Amazon 30.06.2015 04:19
Vielen Dank für Ihre Bestellung
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing e
MTB News 27.06.2015 14:08
Verbindliche Bestellung Banshee Headbadge
Blindtext - Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ae
Otto GmbH 26.06.2015 23:16
MTB News
Vielen Dank für Ihre Bestellung
01.07.2015 17:09
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Aenean commodo ligula eget dolor. Aenean massa strong. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Donec quam felis, ultricies nec, pellentesque eu, pretium quis, sem. Nulla consequat massa quis enim. Donec pede justo, fringilla vel, aliquet nec, vulputate eget, arcu. In em enim
documents.pdf
REPOSITORYPARTSTUF
images.zip


Application Users
Name
Email Address
Phone Number
Lisa
lisa@simpsons.com
555-111-1224
Bart
bart@simpsons.com
555-222-1234
Homer
home@simpsons.com
555-222-1244
Marge
marge@simpsons.com
555-222-1254
Page
2
of 3
Displaying 5 - 8 of 12


ORACLE
MySQL

1 .. n



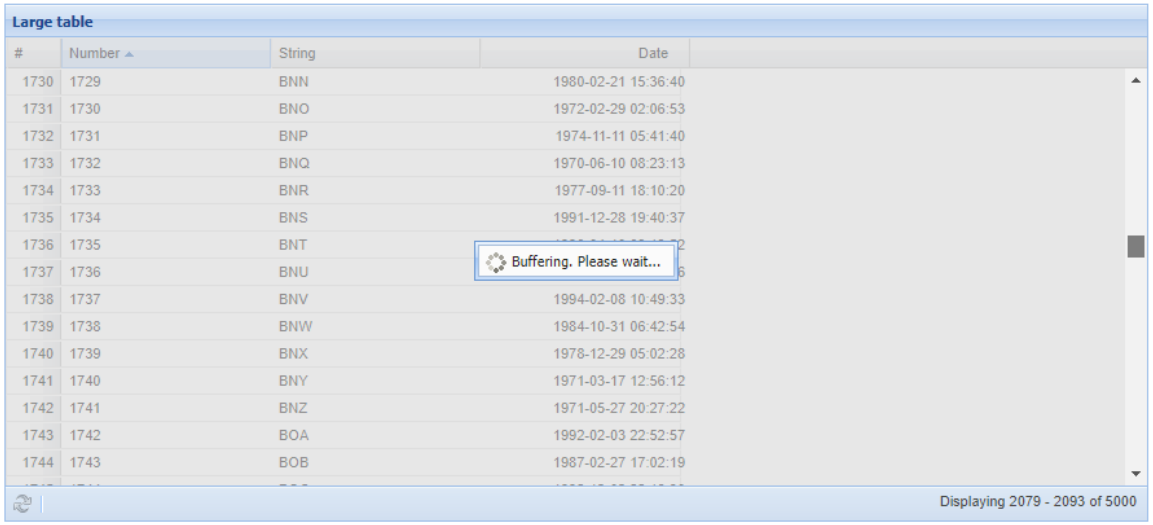


1 .. n

Pros:
- easy to maintain
- view on snapshots of data
do not ask for much code wise
- user stays focused

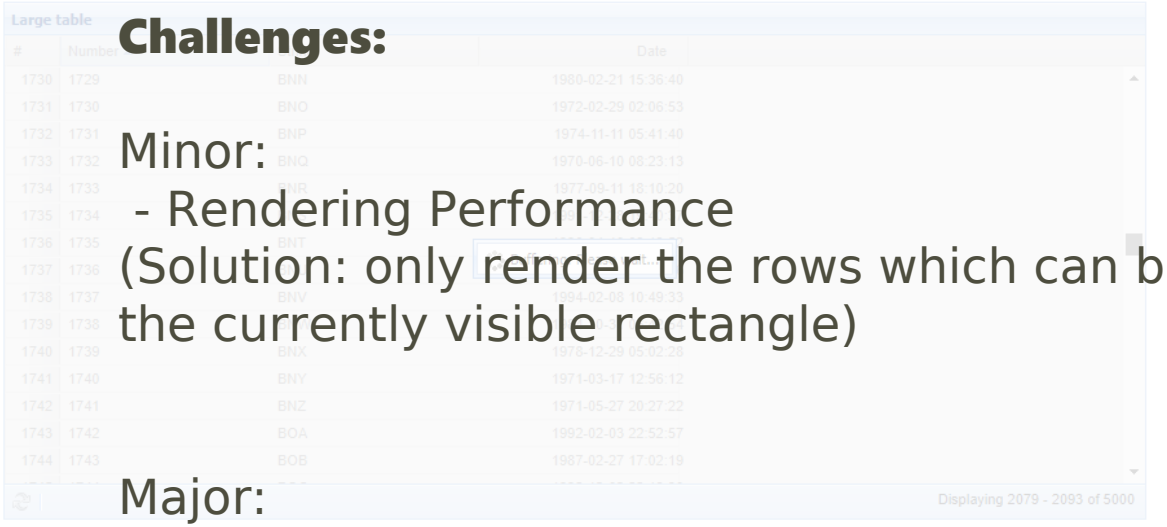
Cons:
- browsing through/operations on data require more user interaction
- ux not consistent (e.g. data does not shift)

Ext.ux.Livegrid



GridView (1902)
Store
RowSelectionModel
Toolbar
GridPanel
CheckboxSelectionModel
EditorGridPanel
JsonReader
DragZone

```
// skip recalculating the row index if we are currently buffering, but not if we
// are just pre-buffering
// ... also, skip recalculating if the store is currently invalid
```



Challenges:

Minor:
- Rendering Performance

(Solution: only render the rows which can be rendered into the currently visible rectangle)

Major:

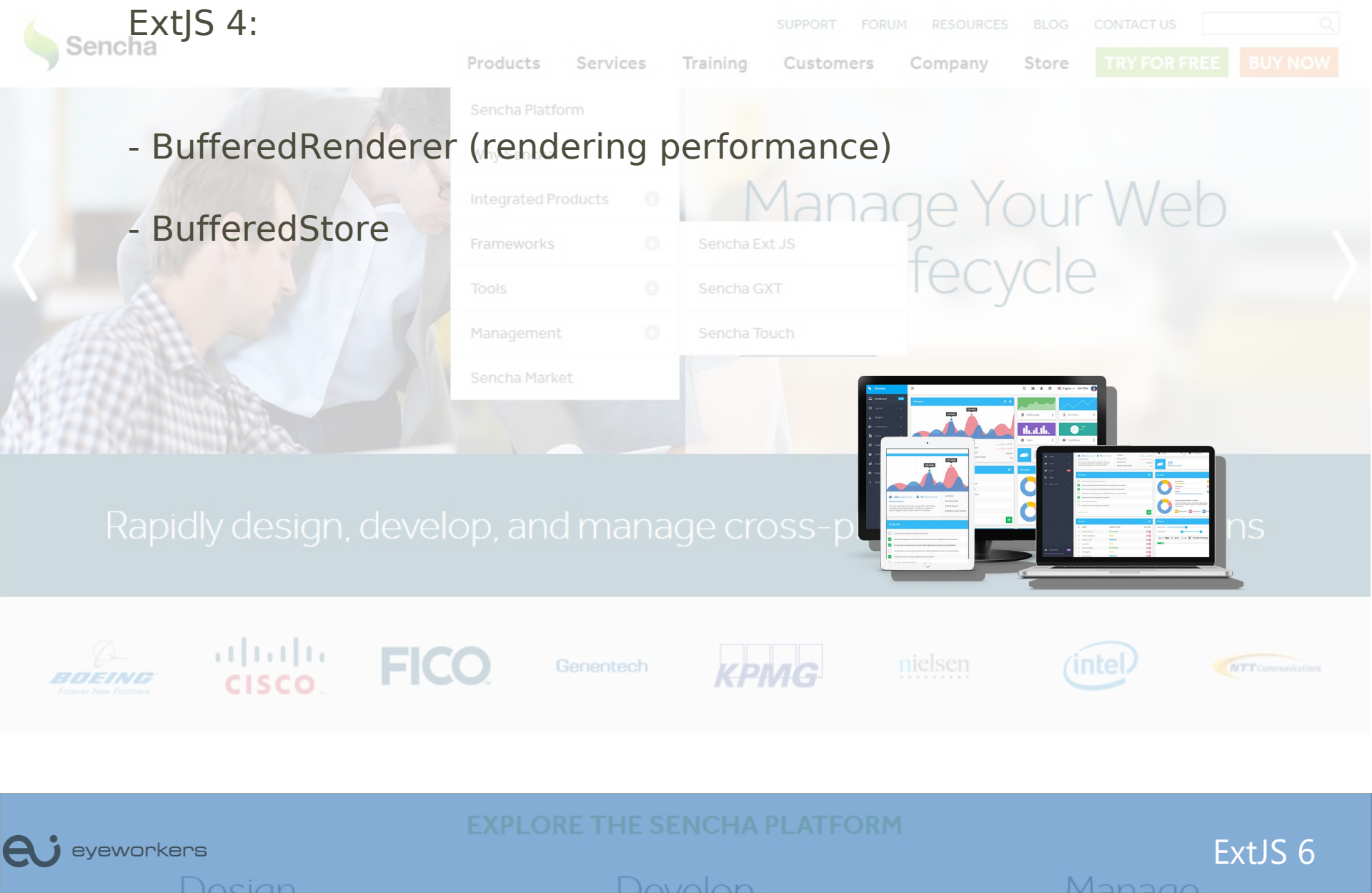
Mirroring state of data was key!

- Delete
- Add
- Update
- MultiSelect (Range)

ExtJS 4:

- BufferedRenderer (rendering performance)

- BufferedStore

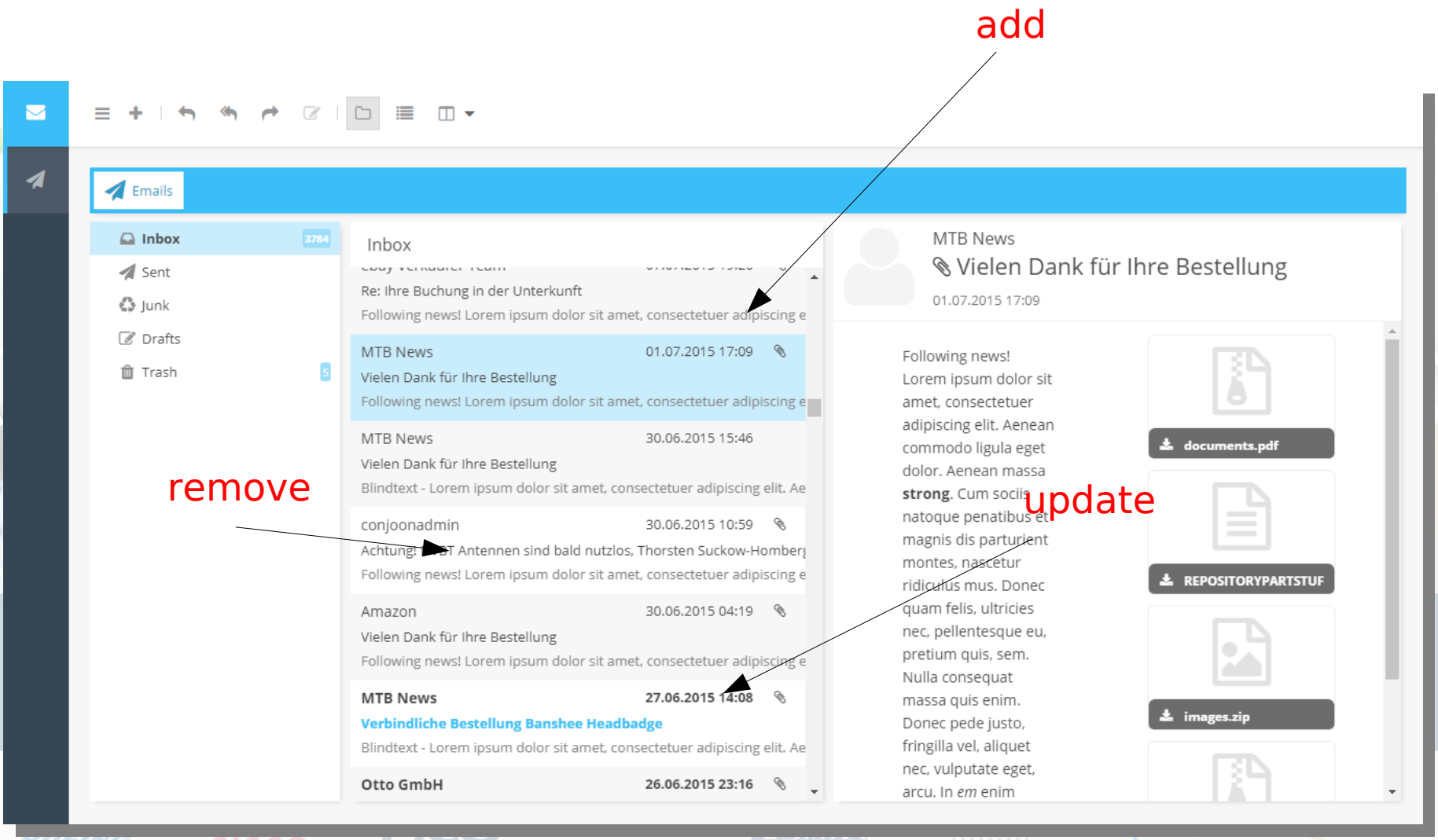


ExtJS 4:

- BufferedRenderer (rendering performance)

- BufferedStore

```
add: function () {
    Ext.raise('add method may not be called on a buffered store - the store is a map of remote data');
},

insert: function () {
    Ext.raise('insert method may not be called on a buffered store - the store is a map of remote data');
},
```


add
Emails
Inbox 3784
Sent
Junk
Drafts
Trash 5
Inbox
Re: Ihre Buchung in der Unterkunft
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing e
MTB News 01.07.2015 17:09
Vielen Dank für Ihre Bestellung
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing e
MTB News 30.06.2015 15:46
Vielen Dank für Ihre Bestellung
Blindtext - Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ae
conjoonadmin 30.06.2015 10:59
Achtung! LTE Antennen sind bald nutzlos, Thorsten Suckow-Homberg
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing e
Amazon 30.06.2015 04:19
Vielen Dank für Ihre Bestellung
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing e
MTB News 27.06.2015 14:08
Verbindliche Bestellung Banshee Headbadge
Blindtext - Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ae
Otto GmbH 26.06.2015 23:16
remove
update
MTB News
Vielen Dank für Ihre Bestellung
01.07.2015 17:09
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Aenean commodo ligula eget dolor. Aenean massa strong. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Donec quam felis, ultricies nec, pellentesque eu, pretium quis, sem. Nulla consequat massa quis enim. Donec pede justo, fringilla vel, aliquet nec, vulputate eget, arcu. In em enim
documents.pdf
REPOSITORYPARTSTUF
images.zip

Requirements

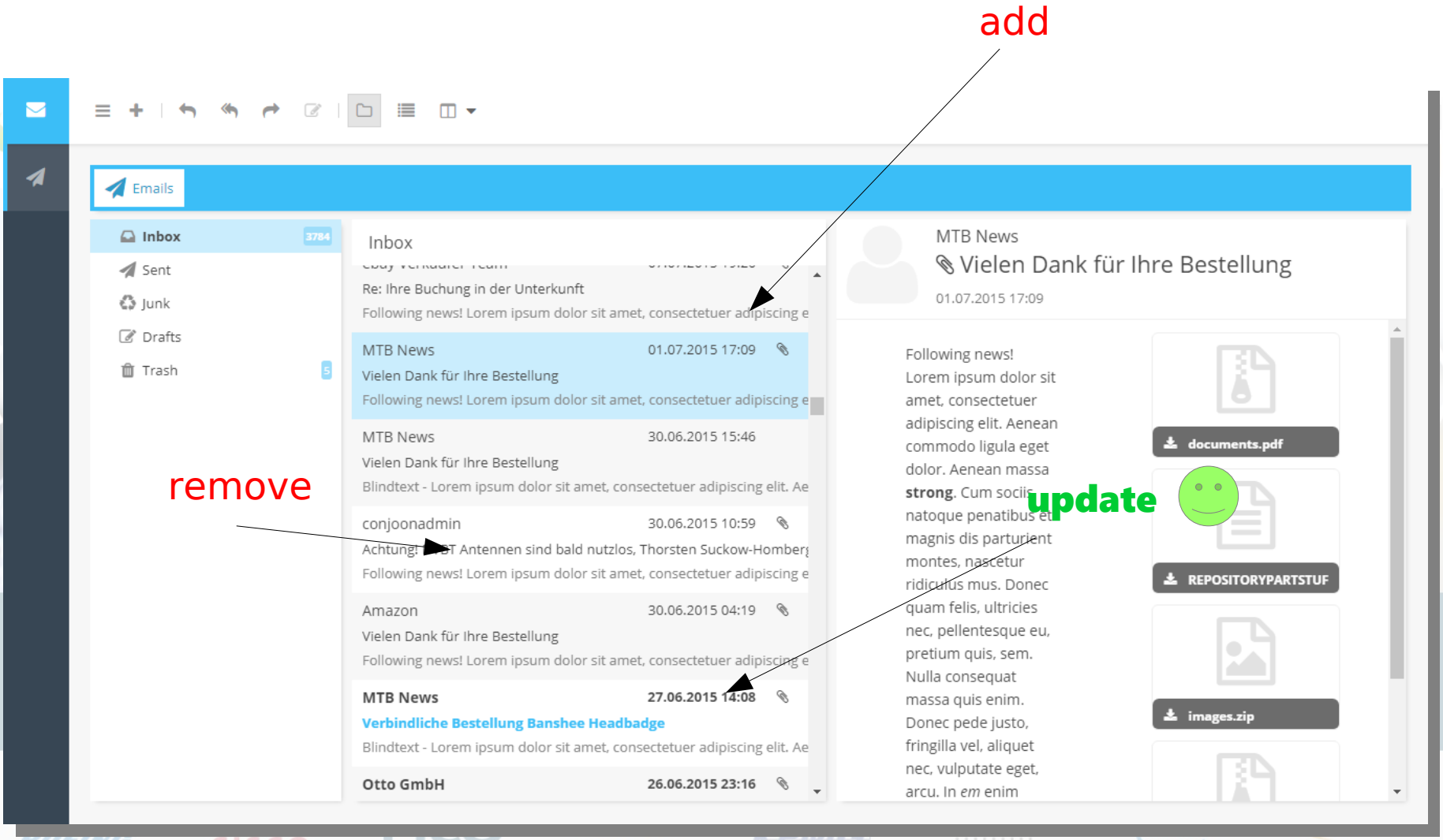
- Grid should immediately show new data while keeping BufferedStore functionality
- Grid should immediately show changes made to data
- Grid should immediately update its View properly when data was removed

Update

- Does not change data set (i.e. number of data)
- Changes data values, reflected by implemented renderer

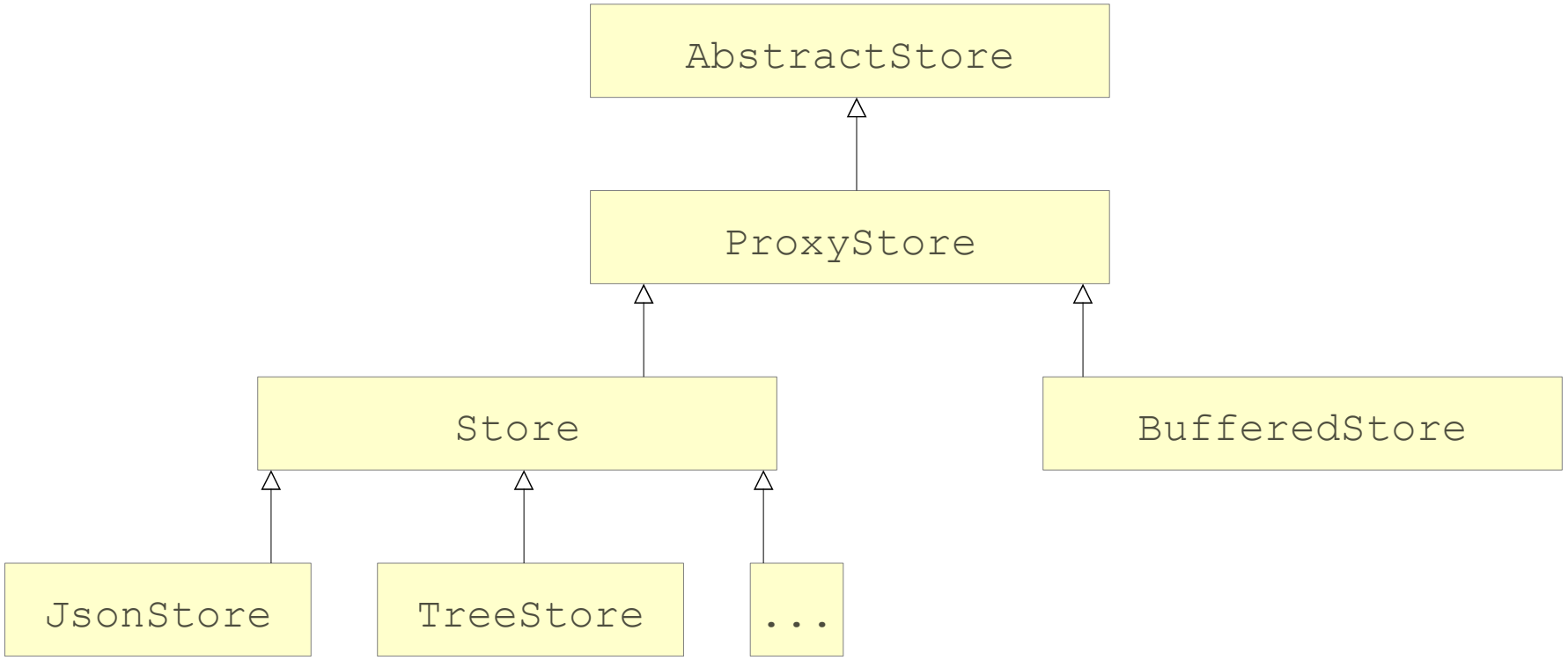
Improvements

- consider manual sort of data once data was changed (`remoteSort : true`), since this does not happen automatically


add
Emails
Inbox 3784
Sent
Junk
Drafts
Trash 5
Inbox
Re: Ihre Buchung in der Unterkunft
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing e
MTB News 01.07.2015 17:09
Vielen Dank für Ihre Bestellung
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing e
MTB News 30.06.2015 15:46
Vielen Dank für Ihre Bestellung
Blindtext - Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ae
conjoonadmin 30.06.2015 10:59
Achtung! LTE Antennen sind bald nutzlos, Thorsten Suckow-Homberg
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing e
Amazon 30.06.2015 04:19
Vielen Dank für Ihre Bestellung
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing e
MTB News 27.06.2015 14:08
Verbindliche Bestellung Banshee Headbadge
Blindtext - Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ae
Otto GmbH 26.06.2015 23:16
remove
MTB News
Vielen Dank für Ihre Bestellung
01.07.2015 17:09
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Aenean commodo ligula eget dolor. Aenean massa strong. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Donec quam felis, ultricies nec, pellentesque eu, pretium quis, sem. Nulla consequat massa quis enim. Donec pede justo, fringilla vel, aliquet nec, vulputate eget, arcu. In em enim
update
documents.pdf
REPOSITORYPARTSTUF
images.zip

Add

- Changes data set (i.e. number of data)
- Challenge: Find data position in the local store and ~~hope~~ assume it is the same on the server (remote operations such as „sorting“ active)
- Find data which needs to be swapped out by the newly added data (BufferedStore contains extracts from remote data)

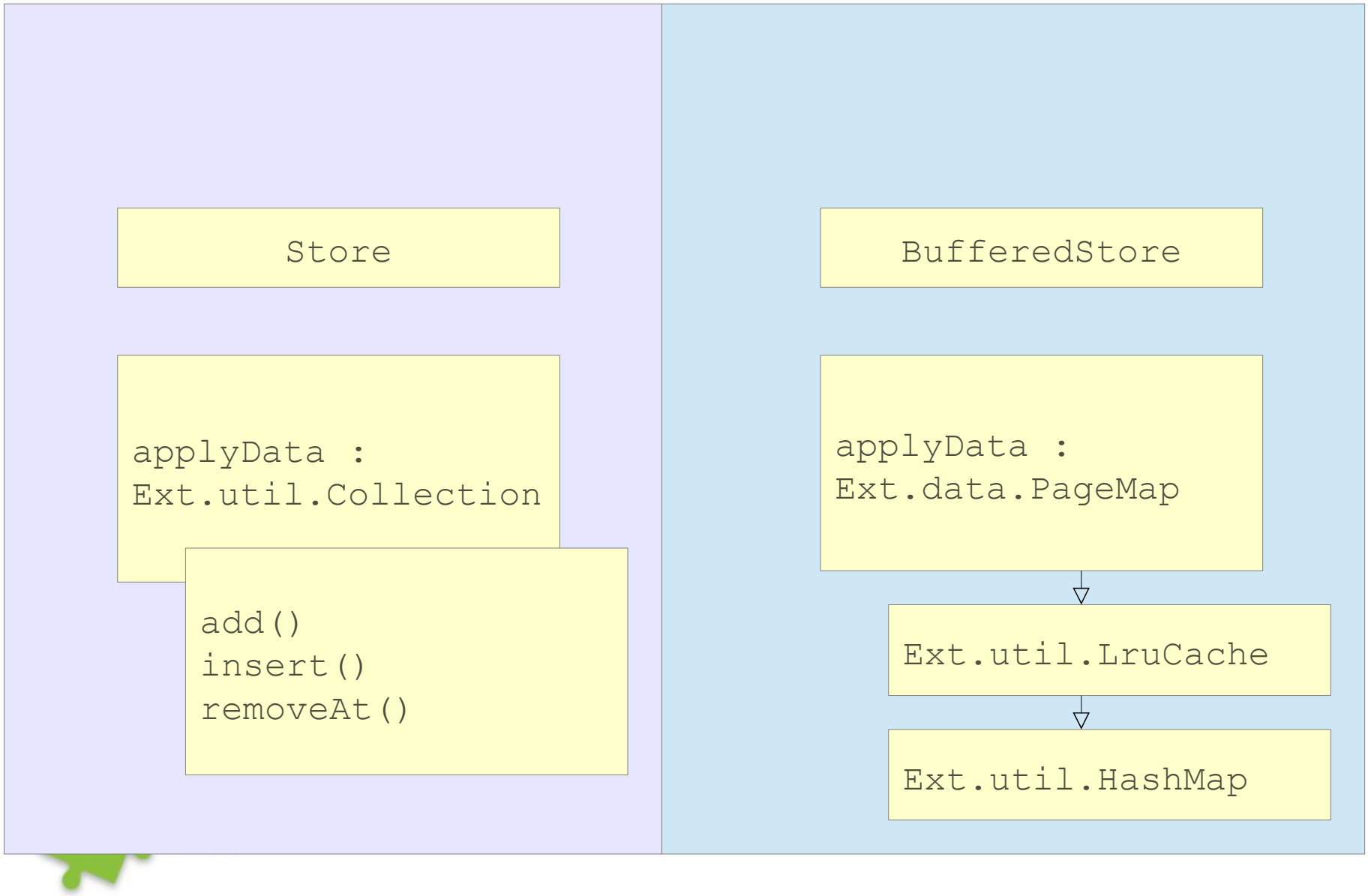

AbstractStore
ProxyStore
Store
BufferedStore
JsonStore
TreeStore
...

Store

BufferedStore

```
applyData :
Ext.util.Collection
```

```
add()
insert()
removeAt()
```


Store
applyData :
Ext.util.Collection
add()
insert()
removeAt()
BufferedStore
applyData :
Ext.data.PageMap
Ext.util.LruCache
Ext.util.HashMap

`Ext.util.LruCache`

- maintains most recently accessed items and discards Least Recently Used (maxSize-property)

- maps pages, not store data:
scrolling → reusePage/loadPage/discardPage

- adding/ removing data solely works on pages, not „store data“

Ext.util.LruCache

```
store.loadPage(1);
console.log(store.getData().map)

1: {prev: {…},  next: {…}, key: 1, value: Array(25)}
2: {prev: {…},  next: {…}, key: 2, value: Array(25)}
3: {prev: {…},  next: {…}, key: 3, value: Array(25)}
4: {prev: {…},  next: {…}, key: 4, value: Array(25)}
5: {prev: null, next: {…}, key: 5, value: Array(25)}
...
12: {prev: {…}, next: null, key: 12, value: Array(25)}
```

Ext.util.LruCache

Pages

```
store.loadPage(1);
console.log(store.getData().map)

1: {prev: {…},  next: {…}, key: 1, value: Array(25)}
2: {prev: {…},  next: {…}, key: 2, value: Array(25)}
3: {prev: {…},  next: {…}, key: 3, value: Array(25)}
4: {prev: {…},  next: {…}, key: 4, value: Array(25)}
5: {prev: null, next: {…}, key: 5, value: Array(25)}
...
12: {prev: {…}, next: null, key: 12, value: Array(25)}
```

Ext.data.Model

Ext.util.LruCache

```
store.loadPage(1);
console.log(store.getData().indexMap)

{1 : 0, 2 : 1, 3 : 2, 4 : 3, 5 : 4, …, 300 : 299}
```

```
<table id="tableview-1018-record-2" ... data-recordid="2" data-recordindex="3" class="...">
```

Add (concrete)

- Get Sorter – sort property, direction
- Find insert index in LruCache.map:
  - iterate through pages
  - compare values based on sort information
  - if insert position found, add new record, remove one record (based on insert strategy, e.g. insert at page 2, index 5, remove record at position 25 to keep pageSize)
- Update indexMap so view can work with newly added data
- Refresh view

```
addSorted : function(record) {
    var me          = this,
        data        = me.getData(),
        index       = me.findInsertIndexInPagesForRecord(record),
        storeIndex = 0,
        page, pos, values;

    if (index === null) {
        return null;
    }

    page   = index[0];
    pos    = index[1];
    values = data.map[page].value;

    Ext.Array.splice(values, pos, 0, record);
    values.pop();

    // Update the indexMap
    for (var startIdx in data.map) {
        for (var i = 0, len = data.map[startIdx].value.length; i < len; i++) {
            data.indexMap[data.map[startIdx].value[i].internalId] = storeIndex++;
        }
    }

    return record;
},
```

```
addSorted : function(record) {
    var me         = this,
        data       = me.getData(),
        index      = me.findInsertIndexInPagesForRecord(re
        storeIndex = 0,
        page, pos, values;

    if (index === null) {
        return null;
    }

    page   = index[0];
    pos    = index[1];
    values = data.map[page].value;

    Ext.Array.splice(values, pos, 0, record);
    values.pop();

    // Update the indexMap
    for (var startIdx in data.map) {
        for (var i = 0, len = data.map[startIdx].value.length; i < len; i++) {
            data.indexMap[data.map[startIdx].value[i].internalId] = storeIndex++;
        }
    }

    return record;
},
```

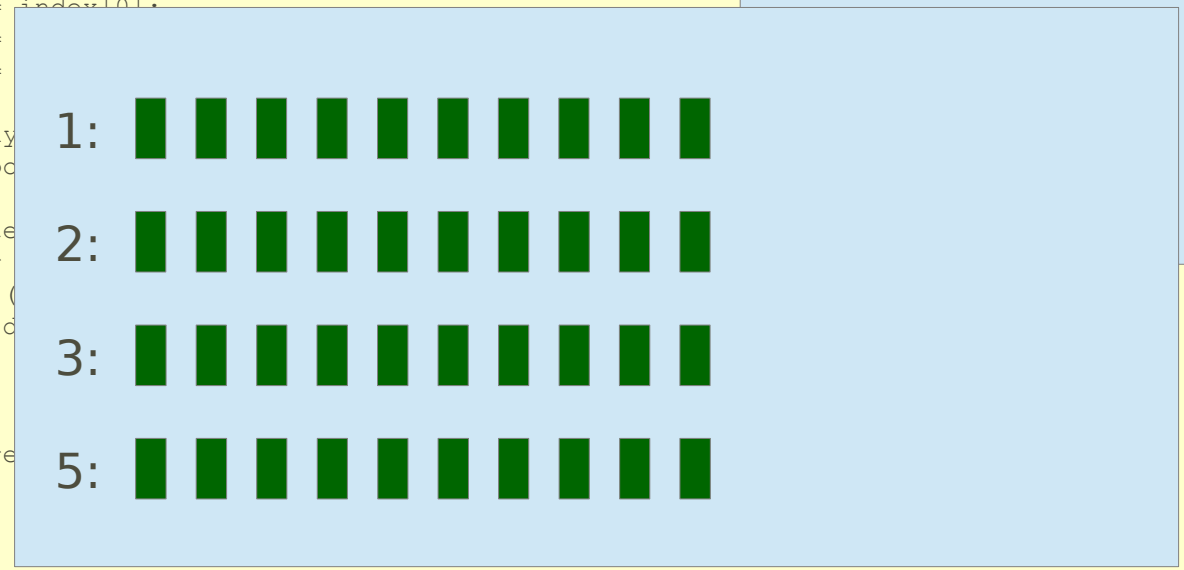
map:

```
1 : {values : [...]},
2 : {values : [...]},
3 : {values : […]},
5 : {values : […]}
```

```
addSorted : function(record) {
    var me          = this,
        data        = me.getData(),
        index       = me.findInsertIndexInPagesForRecord(re
        storeIndex = 0,
        page, pos, values;

    if (index === null) {
        return null;
    }

    page   = index[0];
    pos    =
    values =

    Ext.Array
    values.po

    // Update
    for (var
        for (
            d
        }
    }

    return re
},
```

map:

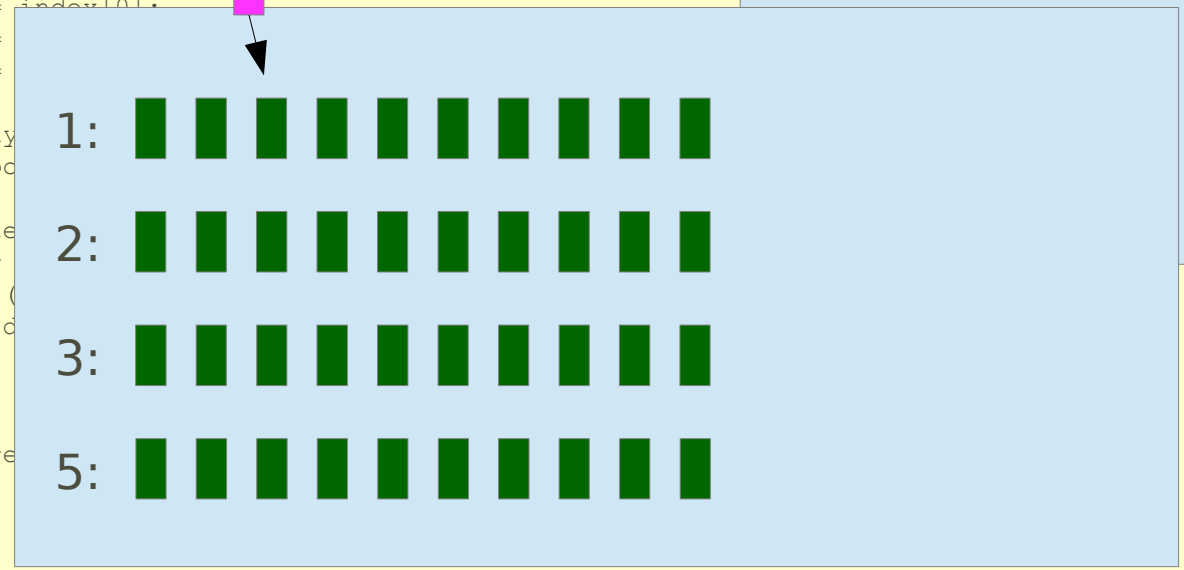
```
1 : {values : [...]},
2 : {values : [...]},
3 : {values : […]},
5 : {values : […]}
```



```
addSorted : function(record) {
    var me          = this,
        data        = me.getData(),
        index       = me.findInsertIndexInPagesForRecord(re
        storeIndex = 0,
        page, pos, values;

    if (index === null) {
        return null;
    }

    page   = index[0];
    pos    =
    values =

    Ext.Array
    values.po

    // Update
    for (var
        for (
            d
        }
    }

    return re
},
```

map:

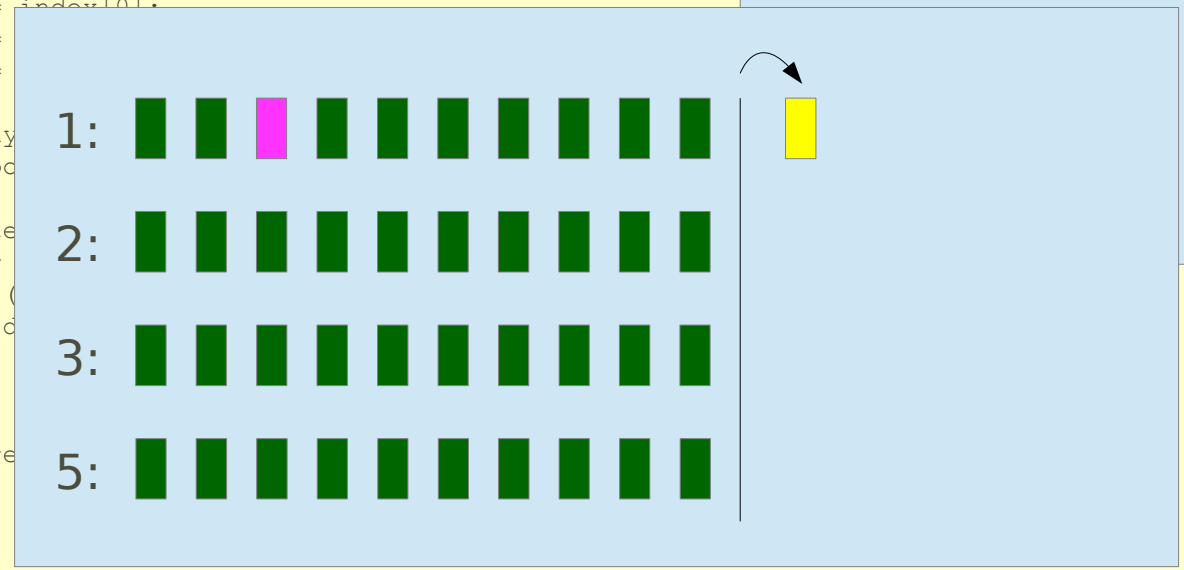
```
1 : {values : [...]},
2 : {values : [...]},
3 : {values : […]},
5 : {values : […]}
```



```
addSorted : function(record) {
    var me          = this,
        data        = me.getData(),
        index       = me.findInsertIndexInPagesForRecord(re
        storeIndex = 0,
        page, pos, values;

    if (index === null) {
        return null;
    }

    page   = index[0];
    pos    =
    values =

    Ext.Array
    values.po

    // Update
    for (var
        for (
            d
        }
    }

    return re
},
```

map:

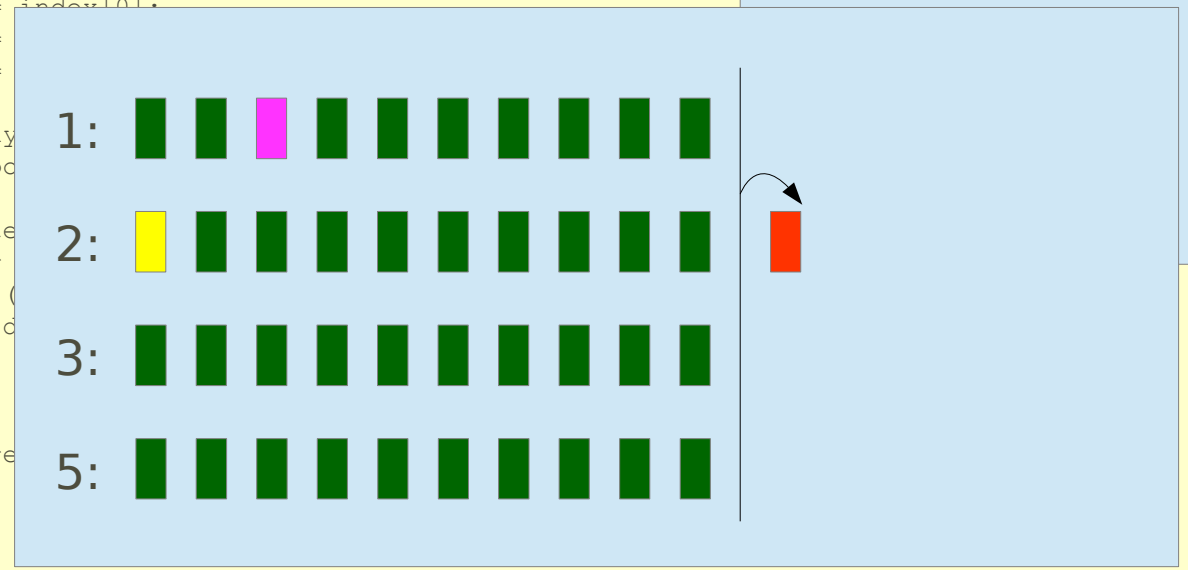
```
1 : {values : [...]},
2 : {values : [...]},
3 : {values : [...]},
5 : {values : [...]}
```



```
addSorted : function(record) {
    var me          = this,
        data        = me.getData(),
        index       = me.findInsertIndexInPagesForRecord(re
        storeIndex = 0,
        page, pos, values;

    if (index === null) {
        return null;
    }

    page   = index[0];
    pos    =
    values =

    Ext.Array
    values.po

    // Update
    for (var
        for (
            d
        }
    }

    return re
},
```

map:

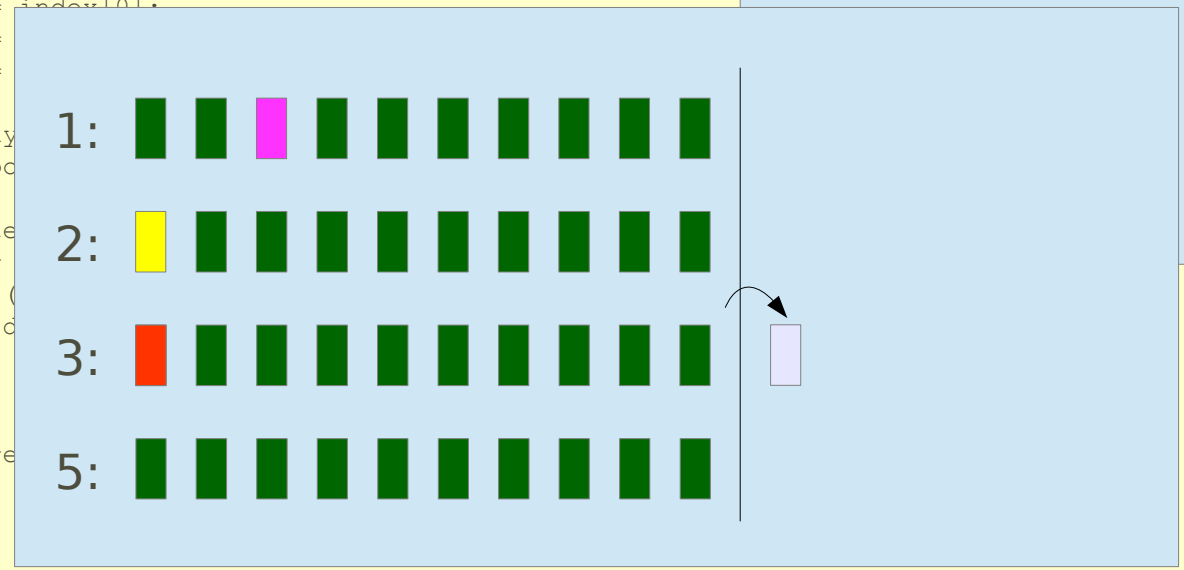
```
1 : {values : [...]},
2 : {values : [...]},
3 : {values : […]},
5 : {values : […]}
```



```
addSorted : function(record) {
    var me          = this,
        data        = me.getData(),
        index       = me.findInsertIndexInPagesForRecord(re
        storeIndex = 0,
        page, pos, values;

    if (index === null) {
        return null;
    }

    page   = index[0];
    pos    =
    values =

    Ext.Array
    values.po

    // Update
    for (var
        for (
            d
        }
    }

    return re
},
```

map:

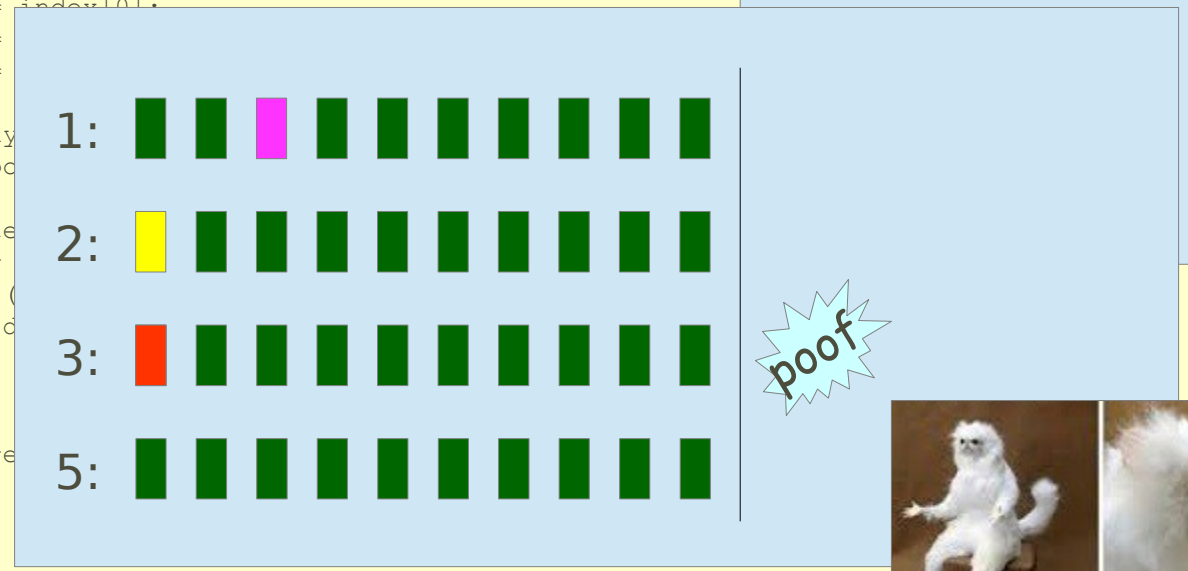
```
1 : {values : [...]},
2 : {values : [...]},
3 : {values : […]},
5 : {values : […]}
```

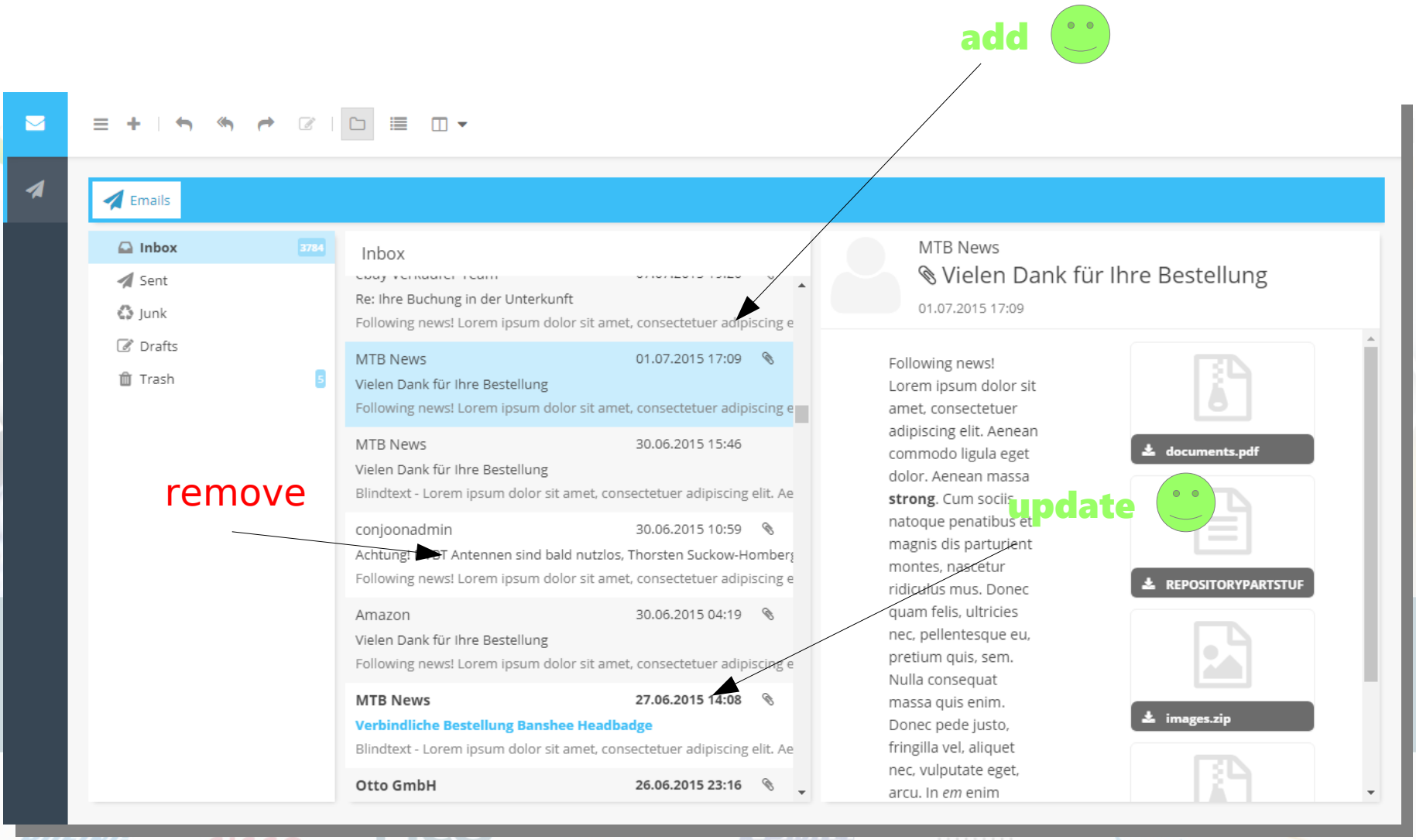


```
addSorted : function(record) {
    var me          = this,
        data        = me.getData(),
        index       = me.findInsertIndexInPagesForRecord(re
        storeIndex = 0,
        page, pos, values;

    if (index === null) {
        return null;
    }

    page   = index[0];
    pos    =
    values =

    Ext.Array
    values.po

    // Update
    for (var
        for (
            d
        }
    }

    return re
},
```

map:

```
1 : {values : [...]},
2 : {values : [...]},
3 : {values : […]},
5 : {values : […]}
```




add
Emails
Inbox 3784
Sent
Junk
Drafts
Trash 5
Inbox
Re: Ihre Buchung in der Unterkunft
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing e
MTB News 01.07.2015 17:09
Vielen Dank für Ihre Bestellung
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing e
MTB News 30.06.2015 15:46
Vielen Dank für Ihre Bestellung
Blindtext - Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ae
conjoonadmin 30.06.2015 10:59
Achtung! LTE Antennen sind bald nutzlos, Thorsten Suckow-Homberg
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing e
Amazon 30.06.2015 04:19
Vielen Dank für Ihre Bestellung
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing e
MTB News 27.06.2015 14:08
Verbindliche Bestellung Banshee Headbadge
Blindtext - Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ae
Otto GmbH 26.06.2015 23:16
remove
MTB News
Vielen Dank für Ihre Bestellung
01.07.2015 17:09
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Aenean commodo ligula eget dolor. Aenean massa strong. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Donec quam felis, ultricies nec, pellentesque eu, pretium quis, sem. Nulla consequat massa quis enim. Donec pede justo, fringilla vel, aliquet nec, vulputate eget, arcu. In em enim
update
documents.pdf
REPOSITORYPARTSTUF
images.zip

Requirements

- ~~Grid should immediately show new data while keeping BufferedStore functionality~~
- ~~Grid should immediately show changes made to data~~
- Grid should immediately update its View properly when data was removed

LruCache shifting problem

- Pages 1-12 are available, page 1 is shown
- Removing data in page 1 – solution: shift data down
- Load data from server and append at the end

LruCache shifting problem

- Pages 1-12 are available, page 1 is shown
- Removing data in page 1 – solution: shift data down
- Load data from server and append at the end

- Computing pages to reload
- Does LRU discard or keep existing pages (add new, remove lru)
- Backend Interaction
- Asynchronous processes
- Waiting for server response
- User scrolls through data while request is active
- Blocking input

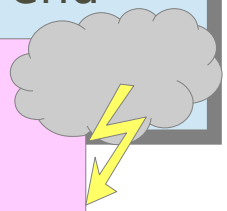
LruCache shifting problem

- P… …wn
- R… …t data dow…
- L… …e end

Fragmentation!

LruCache-map may look like

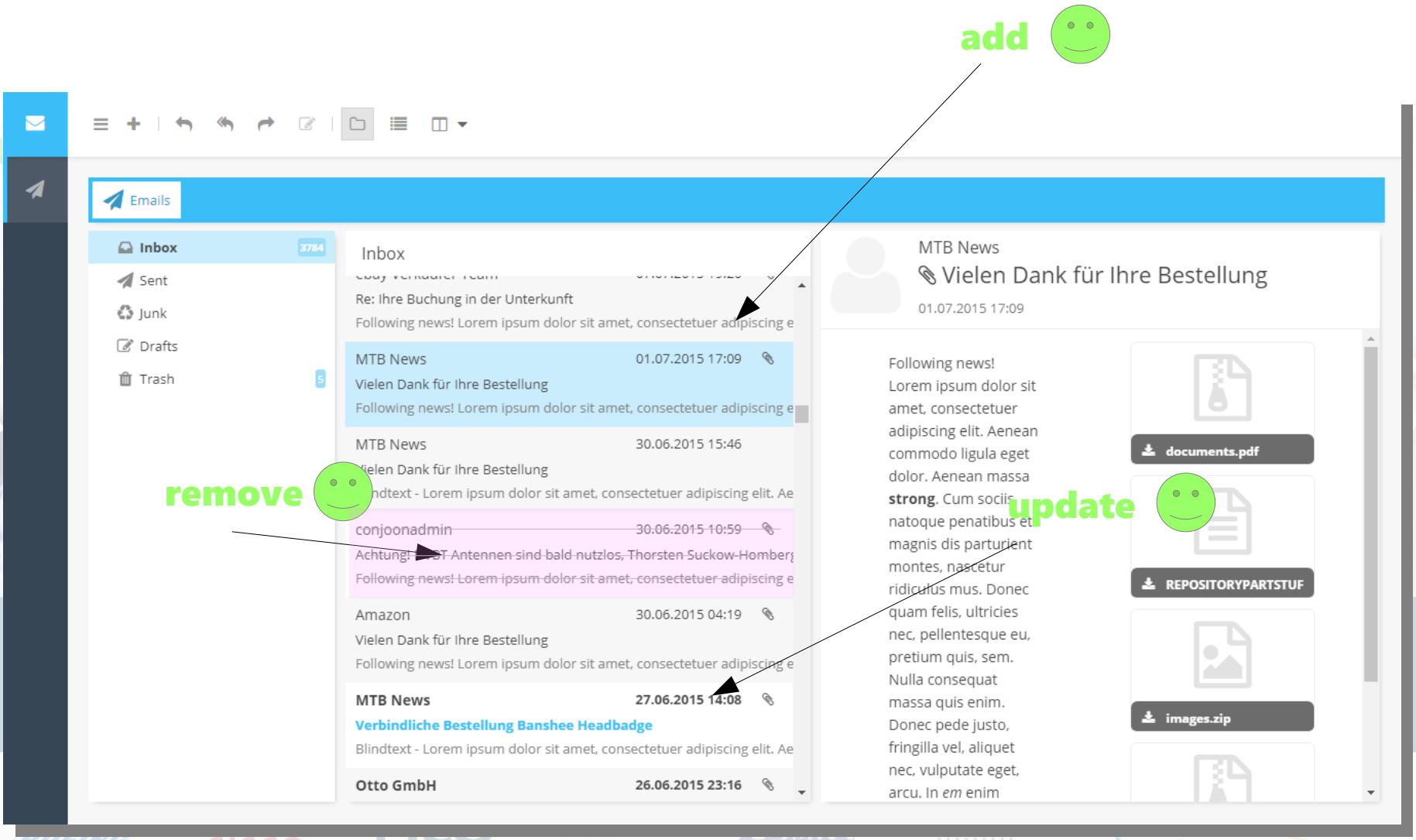
1
2
3
11
12
21
22
23
24
...



Improvements

- after removing data, already buffered pages need to be purged **once a new page loads**

```
1 : 1,   2,  3,  4,  5,  6,  7,  8,  9, 10 [VISIBLE]
2 : 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

DEL    Page 1, id 3
SCROLL Page 3 (Request Parameters: Start 21, Limit 10)

1 : 1,   2, [3], 4,  5,  6,  7,  8,  9, 10
2 : 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
3 : 22, 23, 24, 25, 26, 27, 28, 29, 30, 31  [VISIBLE]

-> Record 21 missing since data shifted in the backend


*[n] = marked as deleted, i.e. visible in the UI, but n/a from backend
```


add
Emails
Inbox 3784
Sent
Junk
Drafts
Trash 5
Inbox
Re: Ihre Buchung in der Unterkunft
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing e
MTB News 01.07.2015 17:09
Vielen Dank für Ihre Bestellung
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing e
MTB News 30.06.2015 15:46
Vielen Dank für Ihre Bestellung
Blindtext - Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ae
remove
conjoonadmin 30.06.2015 10:59
Achtung! LTE Antennen sind bald nutzlos, Thorsten Suckow-Homberg
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing e
Amazon 30.06.2015 04:19
Vielen Dank für Ihre Bestellung
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing e
MTB News 27.06.2015 14:08
Verbindliche Bestellung Banshee Headbadge
Blindtext - Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ae
Otto GmbH 26.06.2015 23:16
MTB News
Vielen Dank für Ihre Bestellung
01.07.2015 17:09
Following news! Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Aenean commodo ligula eget dolor. Aenean massa strong. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Donec quam felis, ultricies nec, pellentesque eu, pretium quis, sem. Nulla consequat massa quis enim. Donec pede justo, fringilla vel, aliquet nec, vulputate eget, arcu. In em enim
update
documents.pdf
REPOSITORYPARTSTUF
images.zip