How to create grids and tables in PDF

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1. Grid and table elements in PDF

If you were to generate reports or similar documents, containing extensive amounts of ordered data, you would probably think whether there is a default, PDF - specific way to do it. We should disappoint you and assert that there’s no such way and PDF specification simply allows us to put drawing commands on PDF page, encouraging to generate the desired representation ourselves.

It should be noted, however, that PDF outlines the special markup technique named “Marked content” that you can use to define the nature of the graphical object sets put on page. It could help you to identify these objects later and provide some application-specific viewing or processing logic. See section *14.6. Marked Content* in PDF specification for details. But you still have to generate the content yourself, marked or not.

Manual generation of grids and tables can appear as a boring task one could rather prefer to be automated. As a part of this article, we’ll dive into details of automatic grid creation and generation and show how to create perfect tables and grids using a few small pieces of C# code and Apitron PDF Kit for .NET component as the main tool.

2. Grid element in flow layout model

The grid element in flow layout model is represented by the `Grid` class and helps to automate the creation of tabulated data in PDF. Its rows are represented by the `GridRow` objects and cells can be of any supported content element type, mostly TextBlocks. To place more than one content element into grid cell, you'd have to use one of the available container objects e.g. `Section`. When content element object is being added into a grid row to represent a cell, one important modification to its style is being made – it becomes a block element. Even if its `Display` property had the value different from `Block` before this addition, it would be set to `Block` and content element would be treated as a grid cell. This modification also assumes that when the column and row sizes are set explicitly, the element representing the cell will be sized accordingly.

The grid element supports automatic splitting and can produce multiple pages if needed. Read more about grids and flow layout model in our book Apitron PDF Kit in action.

2.1 Grid borders and paddings

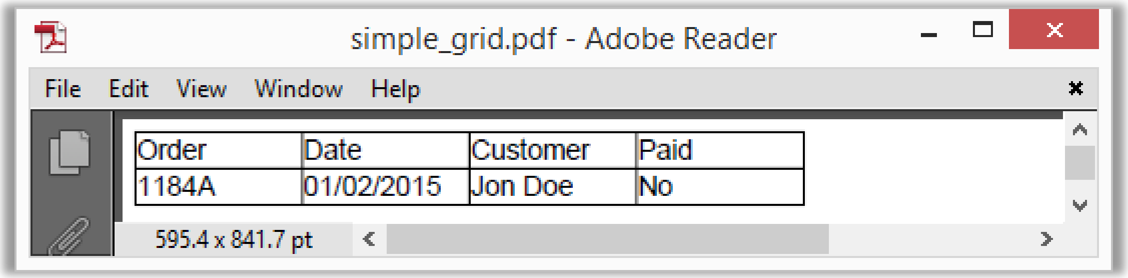
As any other content elements, grids can have standard outer borders and paddings set. In addition, `InnerBorder` and `CellPadding` properties can be used to define one of the main grid's appearance characteristics: thickness and color of lines separating the cells, and inner cell padding.

2.2 Simple grid with uniform cells

Let's create the document containing a simple grid with uniform cells, using the code below:

```
/// <summary>
/// Creates simple grid with default inner border.
/// </summary>
public void CreateSimpleGrid()
{
    // create resource manager and document object
    ResourceManager resourceManager = new ResourceManager();
    FlowDocument doc = new FlowDocument(){Margin = new Thickness(5)};

    // create grid with 4 autosized columns taking 50% of the available space
    Grid grid = new Grid(Length.Auto,Length.Auto,Length.Auto,Length.Auto);
    grid.Width = Length.FromPercentage(50);

    // add 2 grid rows with data
    grid.Add(new GridRow(new TextBlock("Order"), new TextBlock("Date"),
      new TextBlock("Customer"), new TextBlock("Paid")));
    grid.Add(new GridRow(new TextBlock("1184A"), new TextBlock("01/02/2015"),
      new TextBlock("Jon Doe"), new TextBlock("No")));
    // add grid to document
    doc.Add(grid);

    // save document
    using (Stream stream = File.Create("simple_grid.pdf"))
    {
        doc.Write(stream, resourceManager);
    }
}
```

The result looks as follows:



Order	Date	Customer	Paid
1184A	01/02/2015	Jon Doe	No

Pic. 1 Simple pdf grid with uniform cells

Created grid has uniform cells and takes 50% of the available page space; it has single inner border and two data rows (including header).

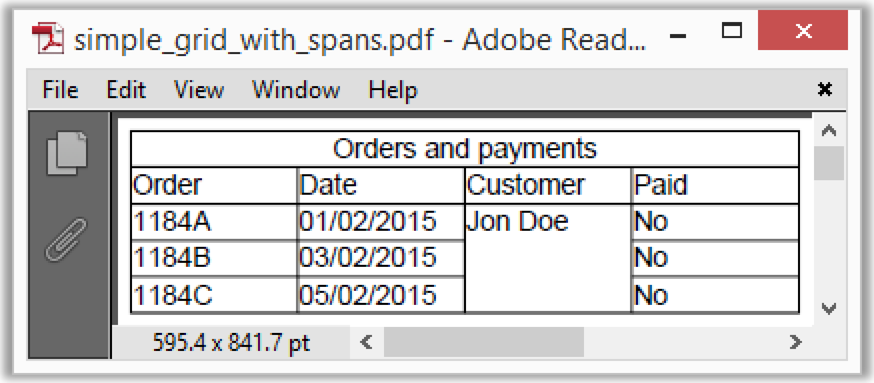
2.3 Simple grid with col spans and row spans

If the "customer" from previous example had more than one order, we could group them all using a row span. To show a col span, we will add a table header spanning across the table.

See the code:

```
public void CreateSimpleGridWithSpans()
{
    // create resource manager and document object
    ResourceManager resourceManager = new ResourceManager();
    FlowDocument doc = new FlowDocument(){Margin = new Thickness(5)};
    // create grid with 4 autosized columns taking 50% of the available space
    Grid grid = new Grid(Length.Auto,Length.Auto,Length.Auto,Length.Auto);
    grid.Width = Length.FromPercentage(50);
    // add header row spanned across the grid
    grid.Add(new GridRow(new TextBlock("Orders and payments") { ColSpan = 4, Align = Align.Center }));
    // add col headers
    grid.Add(new GridRow(new TextBlock("Order"), new TextBlock("Date"),
      new TextBlock("Customer"), new TextBlock("Paid")));
    // add data row with 3d column spanned across 3 rows below
    grid.Add(new GridRow(new TextBlock("1184A"), new TextBlock("01/02/2015"),
      new TextBlock("Jon Doe"){RowSpan = 3}, new TextBlock("No")));
    grid.Add(new GridRow(new TextBlock("1184B"), new TextBlock("03/02/2015"), new TextBlock("No")));
    grid.Add(new GridRow(new TextBlock("1184C"), new TextBlock("05/02/2015"), new TextBlock("No")));
    // add grid to document
    doc.Add(grid);
    // save document
    using (Stream stream = File.Create("simple_grid_with_spans.pdf"))
    {
       doc.Write(stream, resourceManager);
    }
}
```

And resulting image:



Orders and payments			
Order	Date	Customer	Paid
1184A	01/02/2015	Jon Doe	No
1184B	03/02/2015		No
1184C	05/02/2015		No

Pic. 2 Simple grid with col spans and row spans

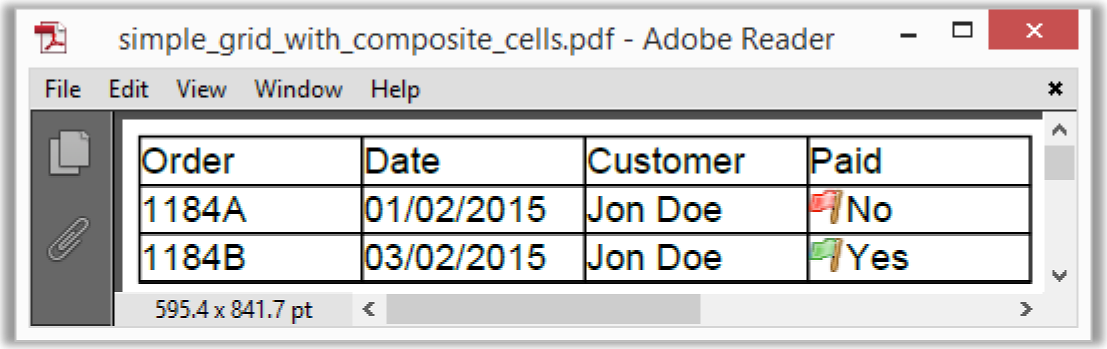
Notice the last two rows having they columns shifted to the right because of the row span in the middle of the row above them.

2.4 Simple grid with composite cells

If you were to put several content elements in one cell, you would have to use a container element. Suitable existing containers are Section and Grid itself. Let's add image and text into the single cell. The code:

```
public void CreateSimpleGridWithCompositeCells()
{
    // create resource manager and register images
    ResourceManager resourceManager = new ResourceManager();
    resourceManager.RegisterResource(
         new Apitron.PDF.Kit.FixedLayout.Resources.XObjects.Image("flag_red", "flag_red.png"));
    resourceManager.RegisterResource(
         new Apitron.PDF.Kit.FixedLayout.Resources.XObjects.Image("flag_green", "flag_green.png"));
    FlowDocument doc = new FlowDocument(){Margin = new Thickness(5)};

    // create grid with 4 autosized columns taking 50% of the available space
    Grid grid = new Grid(Length.Auto,Length.Auto,Length.Auto,Length.Auto);
    grid.Width = Length.FromPercentage(50);
    // add col headers
    grid.Add(new GridRow(new TextBlock("Order"), new TextBlock("Date"), new TextBlock("Customer"), new
TextBlock("Paid")));
    // create section for status cell
    Section paymentStatusNo = new Section(new Apitron.PDF.Kit.FlowLayout.Content.Image("flag_red"),
         new TextBlock("No") );
    grid.Add(new GridRow(new TextBlock("1184A"), new TextBlock("01/02/2015"), new TextBlock("Jon Doe"),
         paymentStatusNo));
    Section paymentStatusYes = new Section(new Apitron.PDF.Kit.FlowLayout.Content.Image("flag_green"),
         new TextBlock("Yes") );
    grid.Add(new GridRow(new TextBlock("1184B"), new TextBlock("03/02/2015"),
         new TextBlock("Jon Doe"), paymentStatusYes));
    doc.Add(grid);
    // save document
    using (Stream stream = File.Create("simple_grid_with_composite_cells.pdf"))
    {
        doc.Write(stream, resourceManager);
    }
}
```

Resulting image:



Order	Date	Customer	Paid
1184A	01/02/2015	Jon Doe	🟥No
1184B	03/02/2015	Jon Doe	🟩Yes

Pic. 3 Simple grid with composite cells

2.5 Multipage grid

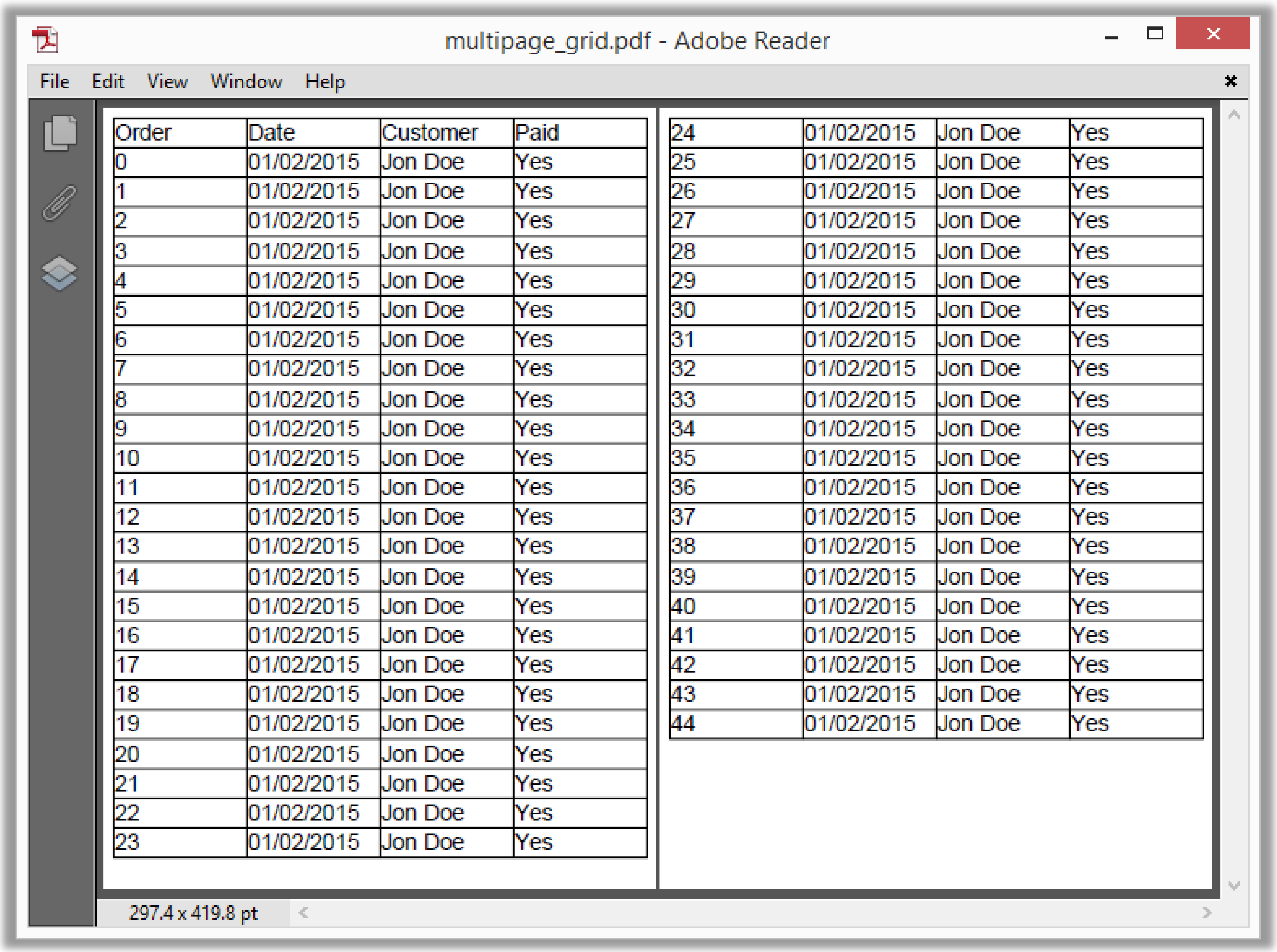
What if you data records take more than one page and have to be paginated? `Grid` element will handle it automatically unless it's explicitly sized. Sample below shows what happens if we rely on this behavior and add more records than a page can fit.

Code sample:

```
/// <summary>
/// Creates multipage grid.
/// </summary>
public void CreateMultipageGrid()
{
    // create resource manager and document object
    ResourceManager resourceManager = new ResourceManager();
    FlowDocument doc = new FlowDocument() { Margin = new Thickness(5) };

    // create grid with 4 autosized columns taking 100% of the available space
    Grid grid = new Grid(Length.Auto, Length.Auto, Length.Auto, Length.Auto);
    // add col headers
    grid.Add(new GridRow(new TextBlock("Order"), new TextBlock("Date"), new TextBlock("Customer"),
      new TextBlock("Paid")));

    // add data records
    for (int rowIndex = 0; rowIndex < 45; rowIndex++)
    {
        grid.Add(new GridRow(new TextBlock(rowIndex.ToString()), new TextBlock("01/02/2015"),
          new TextBlock("Jon Doe"), new TextBlock("Yes")));
    }

    // add grid to document
    doc.Add(grid);

    // save document
    using (Stream stream = File.Create("multipage_grid.pdf"))
    {
        doc.Write(stream, resourceManager, new PageBoundary(Boundaries.A6));
    }
}
```

This code creates a grid split on two parts because it simply doesn't fit on one page. If we add more records or change output page boundary, the number of generated pages will change accordingly. Notice that you don't have to do anything special for this pagination effect to happen, it's fully auto. If you set the grid height explicitly, you will limit the number of visible rows (if their accumulated height exceeds the specified grid height).

The image below shows the resulting PDF document containing multipage grid.



Order	Date	Customer	Paid
0	01/02/2015	Jon Doe	Yes
1	01/02/2015	Jon Doe	Yes
2	01/02/2015	Jon Doe	Yes
3	01/02/2015	Jon Doe	Yes
4	01/02/2015	Jon Doe	Yes
5	01/02/2015	Jon Doe	Yes
6	01/02/2015	Jon Doe	Yes
7	01/02/2015	Jon Doe	Yes
8	01/02/2015	Jon Doe	Yes
9	01/02/2015	Jon Doe	Yes
10	01/02/2015	Jon Doe	Yes
11	01/02/2015	Jon Doe	Yes
12	01/02/2015	Jon Doe	Yes
13	01/02/2015	Jon Doe	Yes
14	01/02/2015	Jon Doe	Yes
15	01/02/2015	Jon Doe	Yes
16	01/02/2015	Jon Doe	Yes
17	01/02/2015	Jon Doe	Yes
18	01/02/2015	Jon Doe	Yes
19	01/02/2015	Jon Doe	Yes
20	01/02/2015	Jon Doe	Yes
21	01/02/2015	Jon Doe	Yes
22	01/02/2015	Jon Doe	Yes
23	01/02/2015	Jon Doe	Yes

24	01/02/2015	Jon Doe	Yes
25	01/02/2015	Jon Doe	Yes
26	01/02/2015	Jon Doe	Yes
27	01/02/2015	Jon Doe	Yes
28	01/02/2015	Jon Doe	Yes
29	01/02/2015	Jon Doe	Yes
30	01/02/2015	Jon Doe	Yes
31	01/02/2015	Jon Doe	Yes
32	01/02/2015	Jon Doe	Yes
33	01/02/2015	Jon Doe	Yes
34	01/02/2015	Jon Doe	Yes
35	01/02/2015	Jon Doe	Yes
36	01/02/2015	Jon Doe	Yes
37	01/02/2015	Jon Doe	Yes
38	01/02/2015	Jon Doe	Yes
39	01/02/2015	Jon Doe	Yes
40	01/02/2015	Jon Doe	Yes
41	01/02/2015	Jon Doe	Yes
42	01/02/2015	Jon Doe	Yes
43	01/02/2015	Jon Doe	Yes
44	01/02/2015	Jon Doe	Yes

Pic. 4 Multipage grid

We have created only two pages here, but the idea is clear. Whenever you need a multipage grid in PDF, this flow layout code will do the job.

3. Grid rows and cells styling

Flow layout API offers rich styling capabilities in a form of inline or selector-based styles. It is possible to style individual cell elements as well as grid rows with minimum efforts, and create PDF documents with highly customized data grids within minutes.

3.1 Vertical and horizontal content alignment

The most often needed operation is positioning of the content within cell's boundaries. There are two properties designed for that, named `Align` and `VerticalAlign` respectively.

Align property, affects only `Block` or `InlineBlock` elements, just like its analog in HTML. Because table cells are being implicitly treated as block elements, it's possible to align their content using `Align` property exposed by each `ContentElement` descendant. This setting can be inherited by inner block elements, making it possible to set the horizontal alignment for the entire row by setting it for the `GridRow` container object instead of individual cell elements.

VerticalAlign property, can be used to define positioning of inline elements within a *line of content inside the parent,* and is, therefore, dependent on the line height of the parent element. To vertically align an element, one would need to place it *inside* the `Section` or similar container, and then set element's `VerticalAlign` property to the desired value.

In general, to align a piece of content vertically inside the grid cell, you would have to:

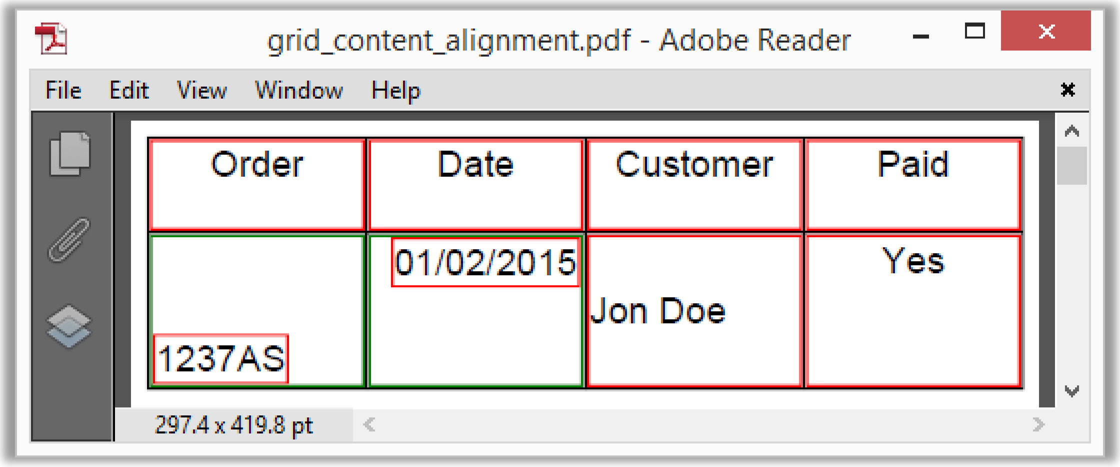
1) create a `Section` representing a cell, add it into `GridRow`
2) set its `LineHeight` to be equal to the height of the parent row
3) add the element to this section, and set its `VerticalAlign` to the desired value

Otherwise, if you had to vertically align single line text block inside the grid row, you could just set its `LineHeight` equal to the parent row height without the use of the intermediate `section`.

Let’s see the sample code showing how to create a grid with variously aligned cells content:

```
/// <summary>
/// Creates a grid with aligned content.
/// </summary>
public void CreateGridWithAlignedContent()
{
    // create resource manager and document object
    ResourceManager resourceManager = new ResourceManager();
    FlowDocument doc = new FlowDocument() { Margin = new Thickness(5) };

    // create border styles for textblocks and sections
    doc.StyleManager.RegisterStyle("TextBlock",
      new Style(){Border = new Border(1), BorderColor = RgbColors.Red});
    doc.StyleManager.RegisterStyle("Section",
      new Style(){Border = new Border(1), BorderColor = RgbColors.Green});

    // create grid with 4 autosized columns taking 100% of the available space
    Grid grid = new Grid(Length.Auto, Length.Auto, Length.Auto, Length.Auto);

    // add header row
    GridRow header = new GridRow(new TextBlock("Order"), new TextBlock("Date"),
      new TextBlock("Customer"), new TextBlock("Paid"));
    // set text alignment, all cells will inherit this setting
    header.Align = Align.Center;
    header.Height = 30;
    grid.Add(header);

    // add content row
    GridRow contentRow = new GridRow(new Section(new TextBlock("1237AS")
        { VerticalAlign = VerticalAlign.Bottom,LineHeight = Length.FromPercentage(110)})
          { Align = Align.Left, LineHeight = 48 },
        new Section(new TextBlock("01/02/2015")
        { VerticalAlign = VerticalAlign.Top,LineHeight = Length.FromPercentage(110)})
          { Align = Align.Right, LineHeight = 48 },
        new TextBlock("Jon Doe"){LineHeight = 48},
        new TextBlock("Yes") {Align = Align.Center});

    contentRow.Height = 50;
    grid.Add(contentRow);

    // add grid to document
    doc.Add(grid);

    // save document
    using (Stream stream = File.Create("grid_content_alignment.pdf"))
    {
        doc.Write(stream, resourceManager, new PageBoundary(Boundaries.A6));
    }
}
```

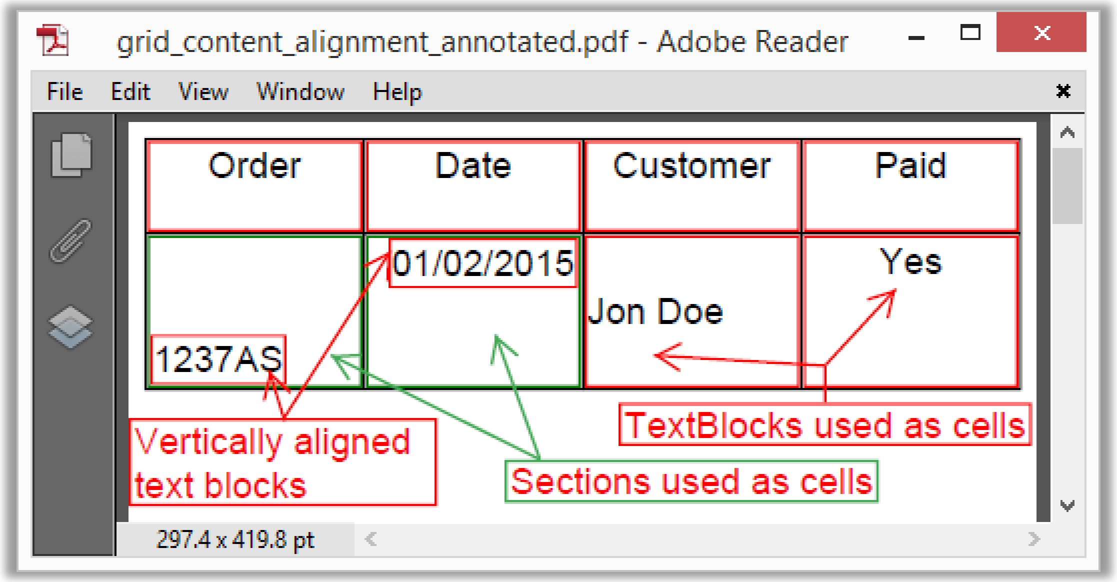
Take a look at the image representing the results created by the piece of code above:


grid_content_alignment.pdf - Adobe Reader
File Edit View Window Help
297.4 x 419.8 pt

Order	Date	Customer	Paid
1237AS	01/02/2015	Jon Doe	Yes

Pic. 5 Cell's content alignment

Sections and TextBlocks have color borders around them to make their boundaries visible, and provide visual markers for further analysis. See the annotated image below, it highlights the key elements and explains the structure of the grid shown above.


grid_content_alignment_annotated.pdf - Adobe Reader
File Edit View Window Help
Vertically aligned text blocks
Sections used as cells
TextBlocks used as cells
297.4 x 419.8 pt

Order	Date	Customer	Paid
1237AS	01/02/2015	Jon Doe	Yes

Pic. 6 Cells' content alignment annotated

All content elements have borders added using matching styles. See that vertically aligned text blocks are positioned within sections added as cells and with their `LineHeight` set to row height. TextBlocks, used as cells, align their content differently. The one, containing "John Doe", has its `LineHeight` set to row height; the others have default line heights (based on font height), and their content is vertically aligned within the lines defined by these values.

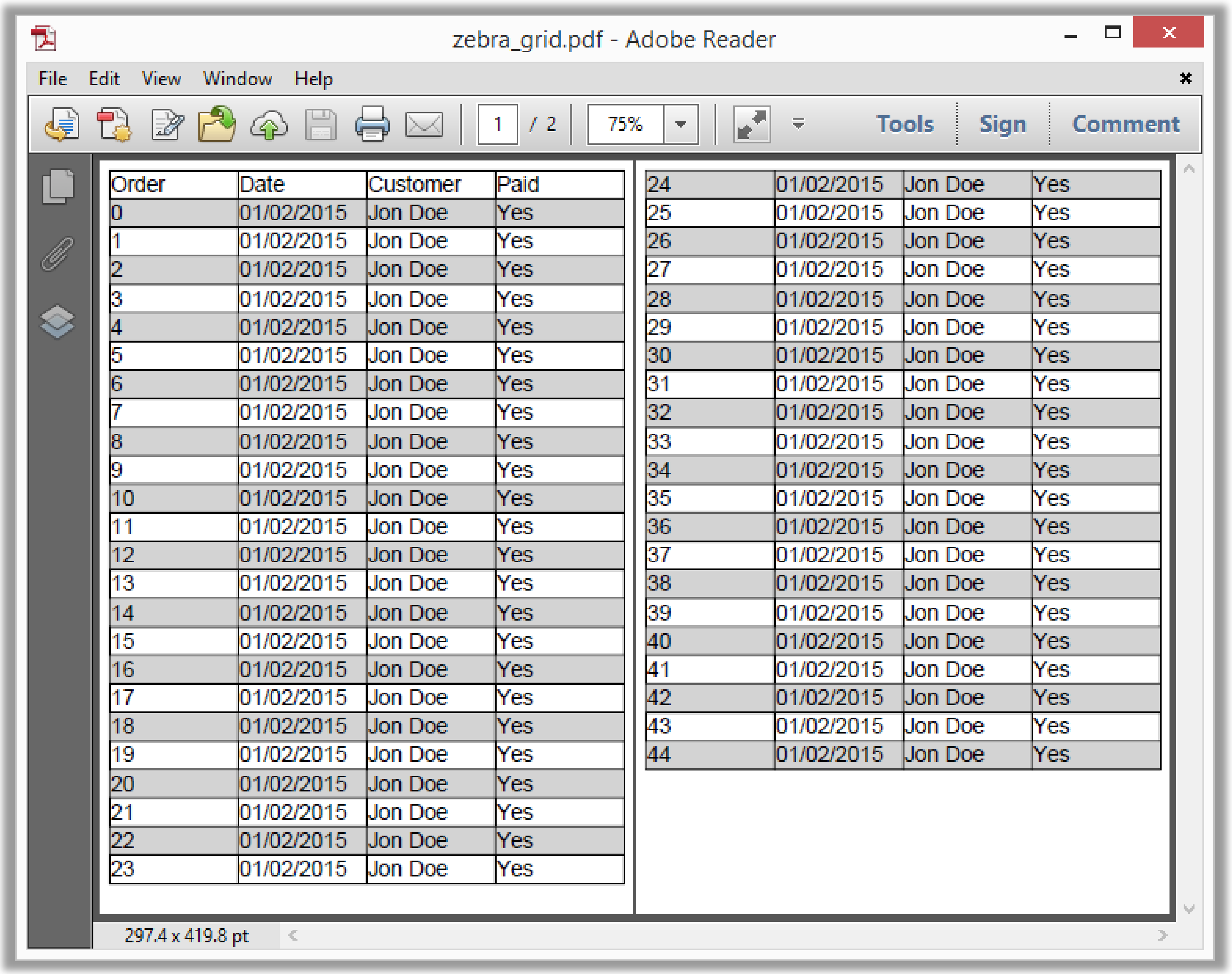
3.2 Highlighting a row with a background color

Highlighting a row with some color is as simple as setting its background color. Another way for achieving the same result is to set background color for all elements in the row. Whichever way you choose, you can either set the Background property of the element explicitly, or use a style object matching one or more elements if needed.

Let’s take the code from multipage grid sample and slightly modify it, turning our grid to zebra:

```
/// <summary>
/// Creates a grid with even rows highlighted.
/// </summary>
public static void CreateZebraGrid()
{
    // create resource manager and document object
    ResourceManager resourceManager = new ResourceManager();
    FlowDocument doc = new FlowDocument() { Margin = new Thickness(5) };
    // register style for even rows using class selector
    doc.StyleManager.RegisterStyle("gridrow.gray",new Style(){Background = RgbColors.LightGray});

    // create grid with 4 autosized columns taking 100% of the available space
    Grid grid = new Grid(Length.Auto, Length.Auto, Length.Auto, Length.Auto);
    // add col headers
    grid.Add(new GridRow(new TextBlock("Order"), new TextBlock("Date"), new TextBlock("Customer"),
        new TextBlock("Paid")));

    // add data records
    for (int rowIndex = 0; rowIndex < 45; rowIndex++)
    {
        GridRow dataRow = new GridRow(new TextBlock(rowIndex.ToString()), new TextBlock("01/02/2015"),
          new TextBlock("Jon Doe"),new TextBlock("Yes"));

        if ((rowIndex & 0x1) == 0)
        {
            dataRow.Class = "gray";
        }

        grid.Add(dataRow);
    }

    // add grid to document
    doc.Add(grid);

    // save document
    using (Stream stream = File.Create("zebra_grid.pdf"))
    {
        doc.Write(stream, resourceManager, new PageBoundary(Boundaries.A6));
    }
}
```

Resulting grid is shown on the image below:



Order	Date	Customer	Paid
0	01/02/2015	Jon Doe	Yes
1	01/02/2015	Jon Doe	Yes
2	01/02/2015	Jon Doe	Yes
3	01/02/2015	Jon Doe	Yes
4	01/02/2015	Jon Doe	Yes
5	01/02/2015	Jon Doe	Yes
6	01/02/2015	Jon Doe	Yes
7	01/02/2015	Jon Doe	Yes
8	01/02/2015	Jon Doe	Yes
9	01/02/2015	Jon Doe	Yes
10	01/02/2015	Jon Doe	Yes
11	01/02/2015	Jon Doe	Yes
12	01/02/2015	Jon Doe	Yes
13	01/02/2015	Jon Doe	Yes
14	01/02/2015	Jon Doe	Yes
15	01/02/2015	Jon Doe	Yes
16	01/02/2015	Jon Doe	Yes
17	01/02/2015	Jon Doe	Yes
18	01/02/2015	Jon Doe	Yes
19	01/02/2015	Jon Doe	Yes
20	01/02/2015	Jon Doe	Yes
21	01/02/2015	Jon Doe	Yes
22	01/02/2015	Jon Doe	Yes
23	01/02/2015	Jon Doe	Yes
24	01/02/2015	Jon Doe	Yes
25	01/02/2015	Jon Doe	Yes
26	01/02/2015	Jon Doe	Yes
27	01/02/2015	Jon Doe	Yes
28	01/02/2015	Jon Doe	Yes
29	01/02/2015	Jon Doe	Yes
30	01/02/2015	Jon Doe	Yes
31	01/02/2015	Jon Doe	Yes
32	01/02/2015	Jon Doe	Yes
33	01/02/2015	Jon Doe	Yes
34	01/02/2015	Jon Doe	Yes
35	01/02/2015	Jon Doe	Yes
36	01/02/2015	Jon Doe	Yes
37	01/02/2015	Jon Doe	Yes
38	01/02/2015	Jon Doe	Yes
39	01/02/2015	Jon Doe	Yes
40	01/02/2015	Jon Doe	Yes
41	01/02/2015	Jon Doe	Yes
42	01/02/2015	Jon Doe	Yes
43	01/02/2015	Jon Doe	Yes
44	01/02/2015	Jon Doe	Yes

Pic. 7 Grid with even rows highlighted

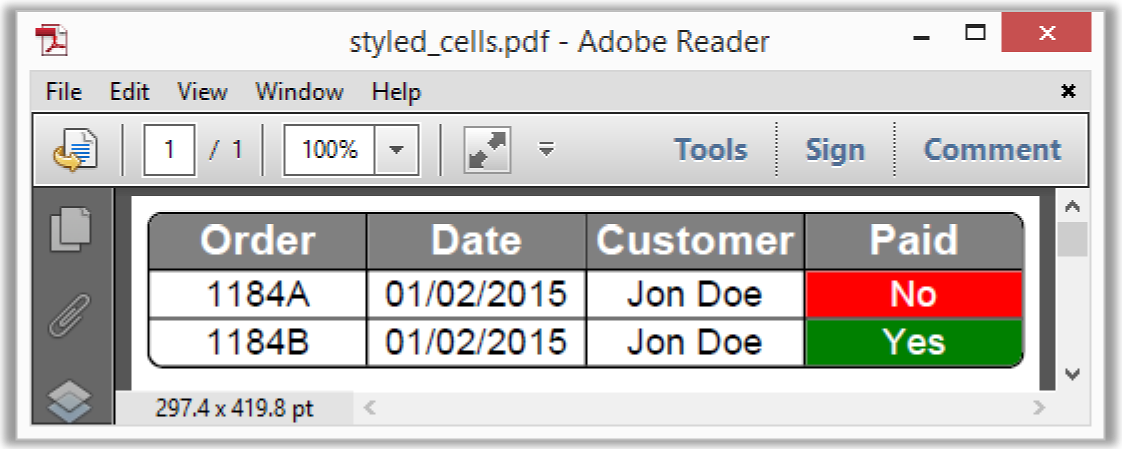
Note that we have added only a simple style based on a class selector matching rows with class “gray”, and assigned this class to each even `GridRow` of the grid. Not much code really, but the final grid changes nicely. It’s possible to define other styles, e.g. for odd rows, every 3rd row and so on. All you need is a right style.

3.3 Cell styling

When it comes to cell styling, the whole arsenal of content element properties is at your disposal. As usual in flow layout, elements inside the grid row can be styled using their exposed properties or matching styles. Let's create a styled version of the very simple grid from section *2.2 Simple grid with uniform cells* See the code:

```
// Creates simple grid with styled cells.
public void CreateGridWithStyledCells()
{
    // create resource manager and document object
    ResourceManager resourceManager = new ResourceManager();
    FlowDocument doc = new FlowDocument() { Margin = new Thickness(5) };
    // register styles:
    // style for all grid rows, sets horizontal content alignment
    doc.StyleManager.RegisterStyle("GridRow", new Style() {Align = Align.Center});

    // style for all child text blocks of the element with class "header", we use it for grid header
    doc.StyleManager.RegisterStyle(".header > TextBlock",
        new Style(){
            Font = new Apitron.PDF.Kit.Styles.Text.Font(StandardFonts.HelveticaBold, 14),
            Color = RgbColors.White,
            Background =  RgbColors.Gray,
        });

    // styles for textblock elements having classes "no" and "yes" respectively
    doc.StyleManager.RegisterStyle("TextBlock.no",
       new Style(){Background = RgbColors.Red, Color = RgbColors.White});
    doc.StyleManager.RegisterStyle("TextBlock.yes",
       new Style(){Background = RgbColors.Green, Color = RgbColors.White});

    // create grid with 4 autosized columns taking 100% of the available space
    Grid grid = new Grid(Length.Auto, Length.Auto, Length.Auto, Length.Auto);
    // create round border
    grid.BorderRadius = 5;

    // add header
    GridRow header = new GridRow(new TextBlock("Order"), new TextBlock("Date"),
        new TextBlock("Customer"), new TextBlock("Paid"));
    header.Class = "header";
    grid.Add(header);

    // add data rows
    grid.Add(new GridRow(new TextBlock("1184A"), new TextBlock("01/02/2015"), new TextBlock("Jon Doe"),
        new TextBlock("No"){Class = "no"}));
    grid.Add(new GridRow(new TextBlock("1184B"), new TextBlock("01/02/2015"), new TextBlock("Jon Doe"),
        new TextBlock("Yes"){Class = "yes"}));

    // add grid to document
    doc.Add(grid);
    // save document
    using (Stream stream = File.Create("styled_cells.pdf"))
    {
        doc.Write(stream, resourceManager, new PageBoundary(Boundaries.A6));
    }
}
```

This code creates a grid with a colored header and two rows. Each of the data rows has its last cell styled according to the state of the payment using one of the defined styles. So, the non-paid one becomes red, and the paid one turns green. In addition, the grid has a round-rect border which, indeed, adds some coolness. See the image below:



Order	Date	Customer	Paid
1184A	01/02/2015	Jon Doe	No
1184B	01/02/2015	Jon Doe	Yes

Pic. 8 Grid cells styling

Styling cells using build-in styling mechanism offers unlimited flexibility and provides an easy and convenient way to achieve complex visual effects in your grids. You can style any element in any cell as you want, and it’s incredibly useful for data visualization.

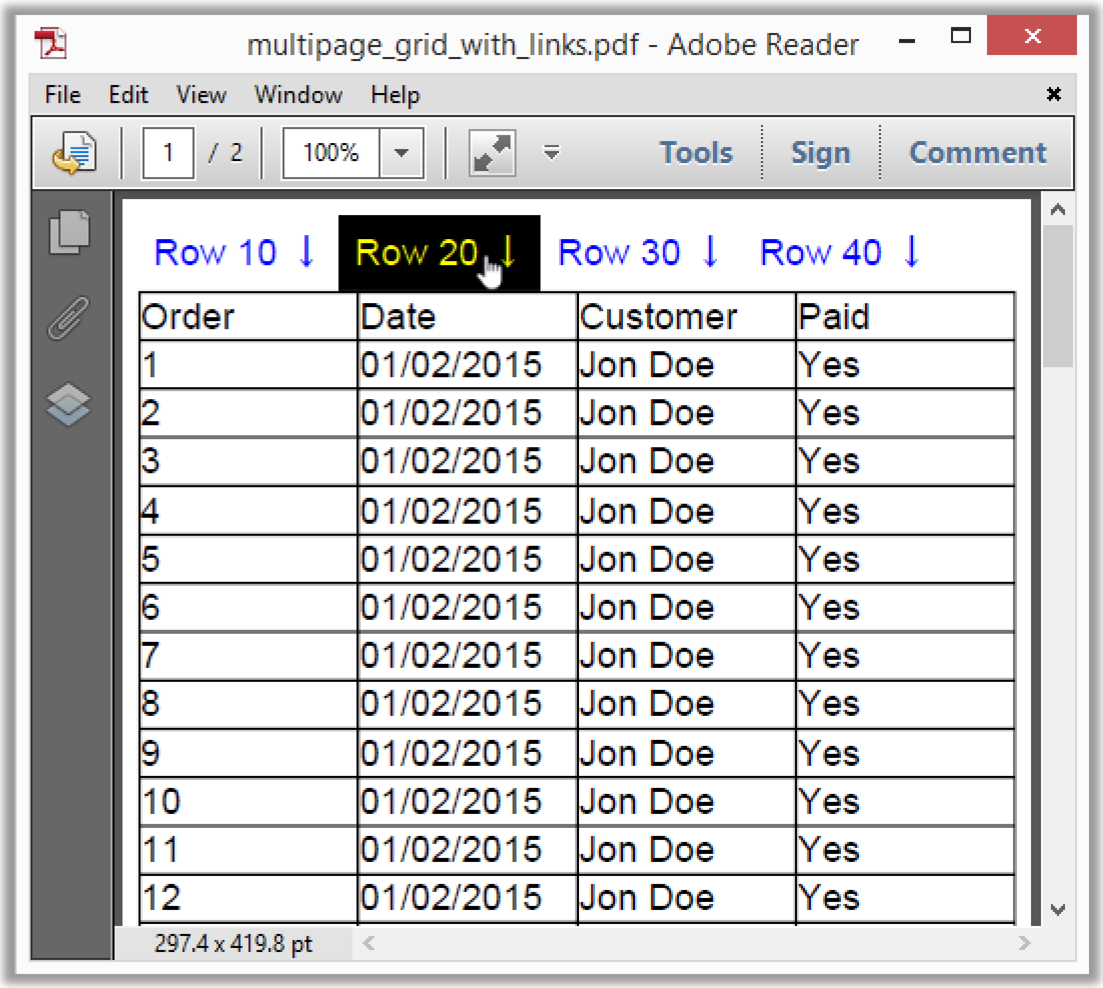
4. Navigation

4.1 Scroll to grid row using links in pdf

Imaging that you have a grid with many data rows and it spans across, say, five pages. You'd like to provide the viewer with a set or links quickly navigating to each 10th, 20th, etc. row. Here the `Link` property of `ContentElement` comes into play. Let's use a slightly modified sample from section *2.5 Multipage Grid*.

```
public void CreateMultipageGridWithLinks()
{
    int rowCount = 45;

    // create resource manager and document object
    ResourceManager resourceManager = new ResourceManager();
    FlowDocument doc = new FlowDocument() { Margin = new Thickness(5) };
    // register a style for links
    doc.StyleManager.RegisterStyle(".link",
        new Style(){ Color = RgbColors.Blue, Margin = new Thickness(5)});

    // create grid with 4 autosized columns taking 100% of the available space
    Grid grid = new Grid(Length.Auto, Length.Auto, Length.Auto, Length.Auto);
    // add col headers
    grid.Add(new GridRow(new TextBlock("Order"), new TextBlock("Date"),
        new TextBlock("Customer"), new TextBlock("Paid")));

    // add data records
    for (int rowIndex = 1; rowIndex <= rowCount; rowIndex++)
    {
        string rowId = rowIndex.ToString();
        /* setting an id for the entire gridrow won't work because
           gridrow objects can't be matched via styles. They are
           special elements which don't actually exist on page.
           So, we assign the id to the first textbox in this row. */
        grid.Add(new GridRow(new TextBlock(rowId){Id=rowId}, new TextBlock("01/02/2015"),
            new TextBlock("Jon Doe"), new TextBlock("Yes")));

        // check if the row should get a link to it
        if (rowIndex % 10 == 0)
        {
            // create textblock serving as link, and reference a row using id set to the first cell
            TextBlock link = new TextBlock(string.Format("Row {0} ↓", rowIndex));
            link.Link = new CrossReference(rowId);
            link.Class = "link";
            doc.Add(link);
        }
    }
    // add grid to document
    doc.Add(grid);
    // save document
    using (Stream stream = File.Create("multipage_grid_with_links.pdf"))
    {
        doc.Write(stream, resourceManager, new PageBoundary(Boundaries.A6));
    }
}
```

The code from above produces a set of links which, when clicked, navigate the viewer to the specific row. See the image below:



Order	Date	Customer	Paid
1	01/02/2015	Jon Doe	Yes
2	01/02/2015	Jon Doe	Yes
3	01/02/2015	Jon Doe	Yes
4	01/02/2015	Jon Doe	Yes
5	01/02/2015	Jon Doe	Yes
6	01/02/2015	Jon Doe	Yes
7	01/02/2015	Jon Doe	Yes
8	01/02/2015	Jon Doe	Yes
9	01/02/2015	Jon Doe	Yes
10	01/02/2015	Jon Doe	Yes
11	01/02/2015	Jon Doe	Yes
12	01/02/2015	Jon Doe	Yes

Pic. 9 Grid navigation

Note that the textblock links placed on top of the page are connected to elements in grid using their `Link` property and a `CrossReference` object, describing the link. A cross reference is a link within the same document created using either element's Id or its instance.

In order to reference a GridRow, you'd have to add a link to one of its cells because GridRow objects are special content elements. They group other objects together logically, but are not getting created on PDF page; thus, they can't be linked to.

It's also possible to create outbound links to other resources using `LinkUri` object, or bookmark page elements using the `Bookmark` property.

5. Conclusion

We demonstrated how to use Apitron PDF Kit to create PDF documents containing complex tabular data structures such as grids. This .NET PDF component is available for many existing platforms and can be used in desktop, mobile, web, and cloud applications and services. We'd like to hear your feedback and see your comments regarding the library and API it offers. Contact our support or ask us here and we'll be happy to answer your questions.