Data Profiling with R & MySQL

July 2011

Lightning Talk at SFBA useR Group

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Background

- *"Discover Data Quality Issues as Early as Possible"*
  - Know quality limitations before building your model!
- First version originally presented at useR! 2006, Vienna
- Original Goals:
  - Very simple to run – just point to database and select tables to examine
  - Column by column profiling – don't attempt JOINs or interactions
  - Output should be obvious to data geeks & DBA's
  - Intelligent profiling based on true or estimated data type
- This Version:
  - Leverage JDBC instead of ODBC connection
  - Pick up MySQL meta data
  - Offload more heavy lifting to SQL queries
  - Use ggplot2 for seamless integration with *grid*
- See: *Data Quality – The Accuracy Dimension* by Jack E. Olson

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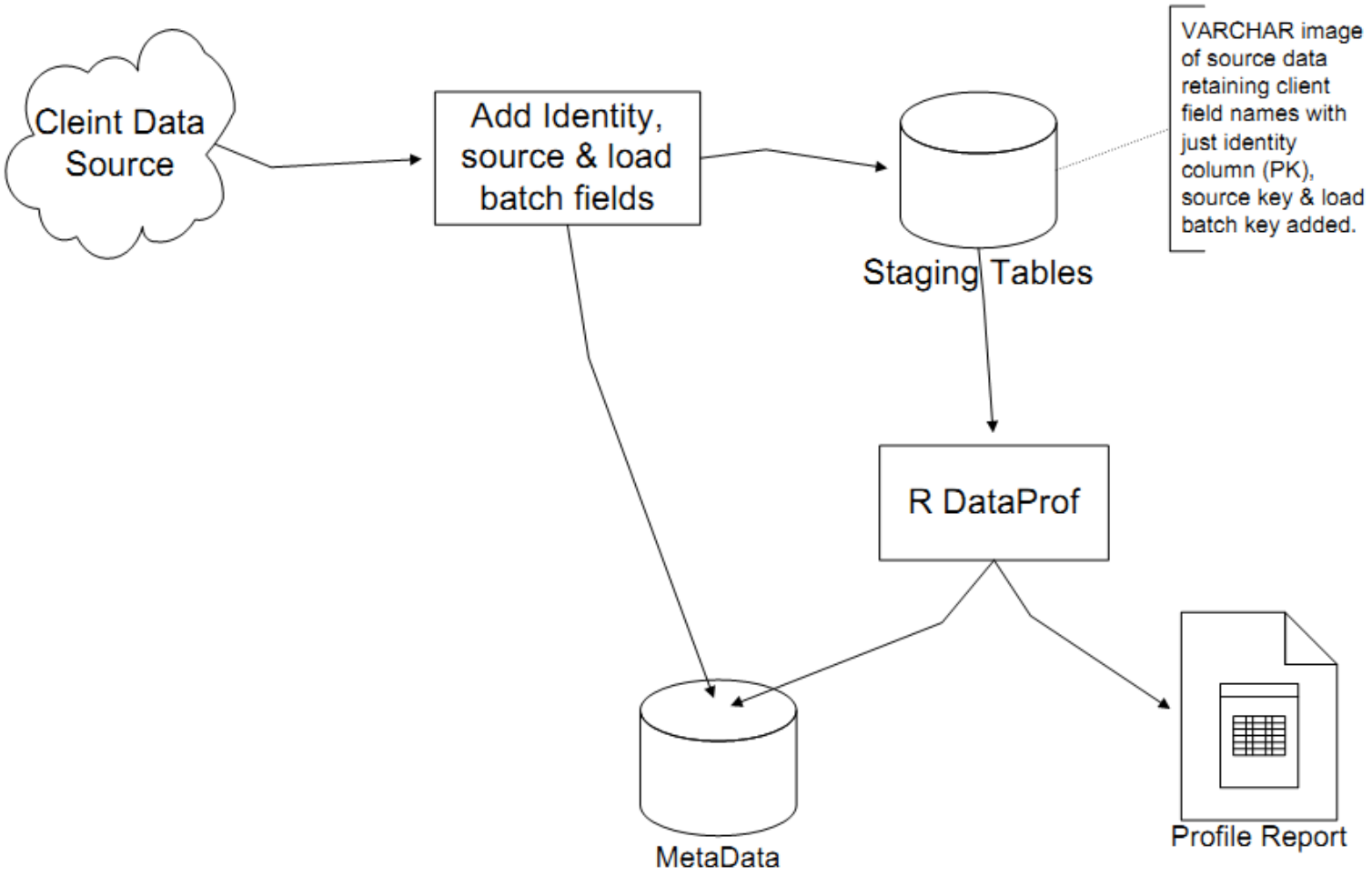
Data Flow for a Profiler



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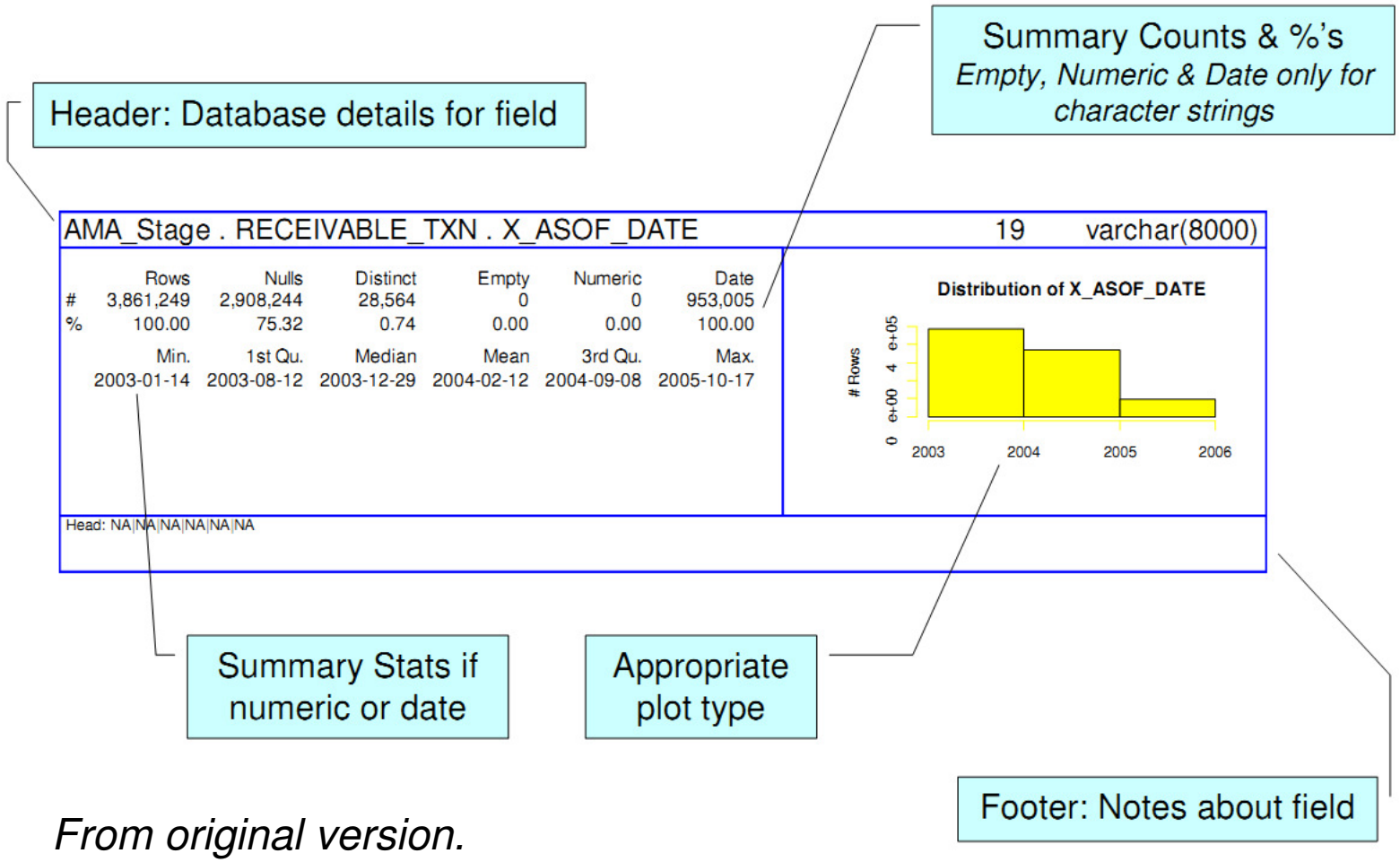
The Profiler Writes Output Panels



From original version.

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SQL Tricks

Not for this talk

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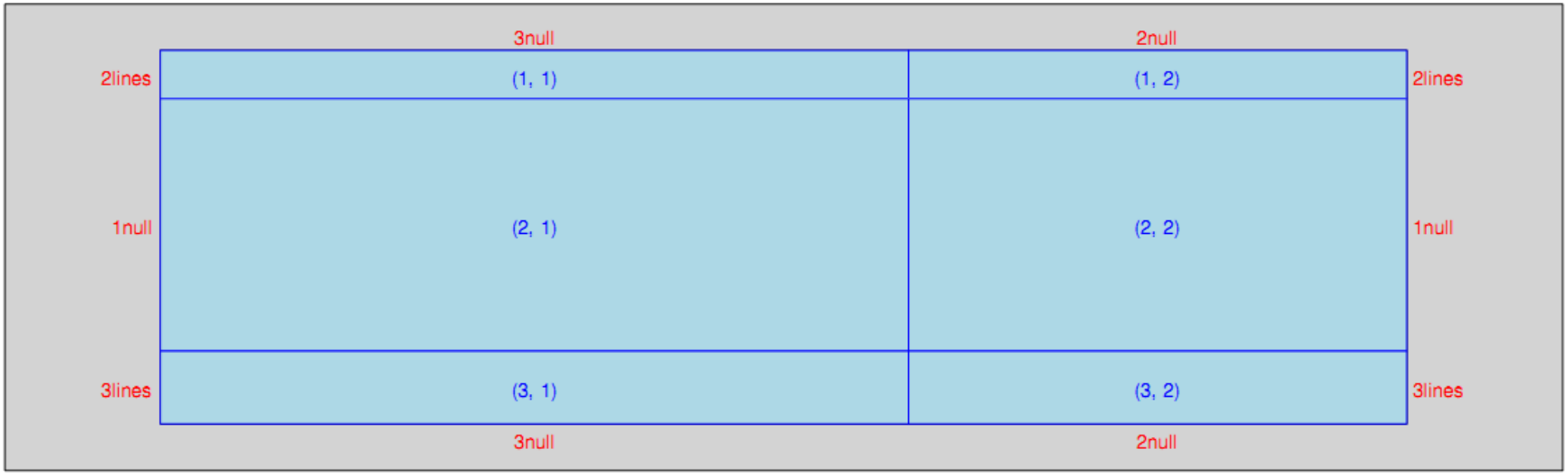
Grid Graphics Tricks (1)

- Set up panel name, output, & layout. Note: it's all about "viewports"!

```
pname <- paste("Plots/ColPlot_", ColDesc$Table, "_C", ithCol, ".png", sep = "")
png(pname, width = 10.5, height = 3, units = "in", res = 600, pointsize = 10)

TopLayout <- grid.layout(nrow = 3, ncol = 2,
                         widths = unit(c(3, 2), c("null", "null")),
                         heights = unit(c(2, 1, 3), c("lines", "null", "lines"))
                         )
 # grid.show.layout(TopLayout)      ## <<< Debug only
 vpTopLayout <- viewport(layout = TopLayout)
```



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Grid Graphics Tricks (2)

- Walk through the viewports starting with the header:

```
pushViewport(vpTopLayout)
 grid.rect(gp = gpar(col = "blue", lwd = 3))

 pushViewport(viewport(layout.pos.col = 1:2, layout.pos.row = 1))
  grid.rect(gp = gpar(col = "blue", lwd = 2))

  grid.text(paste(ColDesc$DB, ColDesc$Table, ColDesc$Column, sep = " . "),
            x = unit(0.2, "char"), y = unit(0.6, "lines"), just = "left",
            gp=gpar(col="black", fontsize=18))

  grid.text(ColDesc$ColSeqNum, x = unit(0.8, "npc"), y = unit(0.6, "lines"),
             just = "right", gp=gpar(col="black", fontsize=18))

  grid.text(paste(ColDesc$ColType, "(",
                  ifelse(is.na(ColDesc$ColWidth), "", ColDesc$ColWidth),
                  ") ", sep = ""),
            x = unit(1, "npc"), y = unit(0.6, "lines"), just = "right",
            gp=gpar(col="black", fontsize=18))

 popViewport()
```


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Grid Graphics Tricks (3)

- Using grid based ggplot2 means no more fiddling with gridbase!

```
### generate plot as funciton of ColPlot value
  p <- NULL     ## one of following should build a plot p, if not throw error plot
  # a Category plot
  if (ColDesc$ColPlot == "Category") {
    p <- qplot(ColValue, NumRows, data = PlotValues, geom = "bar",
               stat = "identity", xlab = "", ylab = "# Rows",
               main = paste("Categories in", ColDesc$Column),
               fill = I("grey50")) + coord_flip()
  }

                >>> cut <<<

  # throw error plot if p not built above
  if (is.null(p)) p <- "No plot was built"

## Lastly output ggplot generated above as p
  pushViewport(viewport(layout.pos.col = 2, layout.pos.row = 2:3))
  print(p, vp = viewport(layout.pos.row = 2, layout.pos.col = 2))
  dev.off()          ## no need to pop since we are now using png() to save file
```


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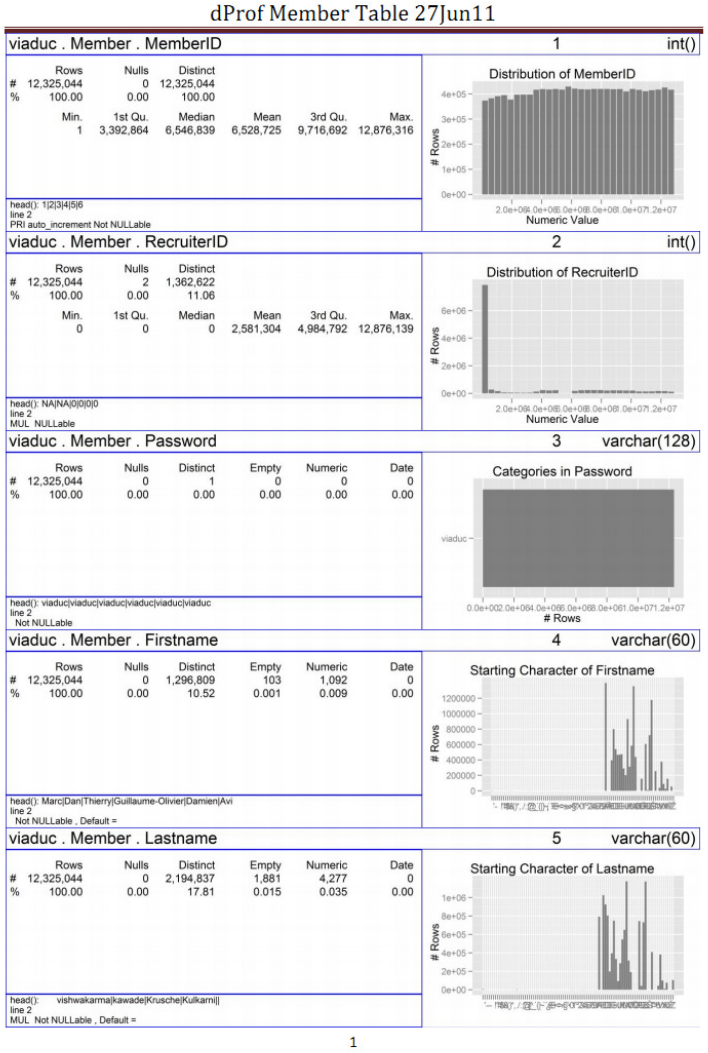
A Couple of Examples (sampled data)



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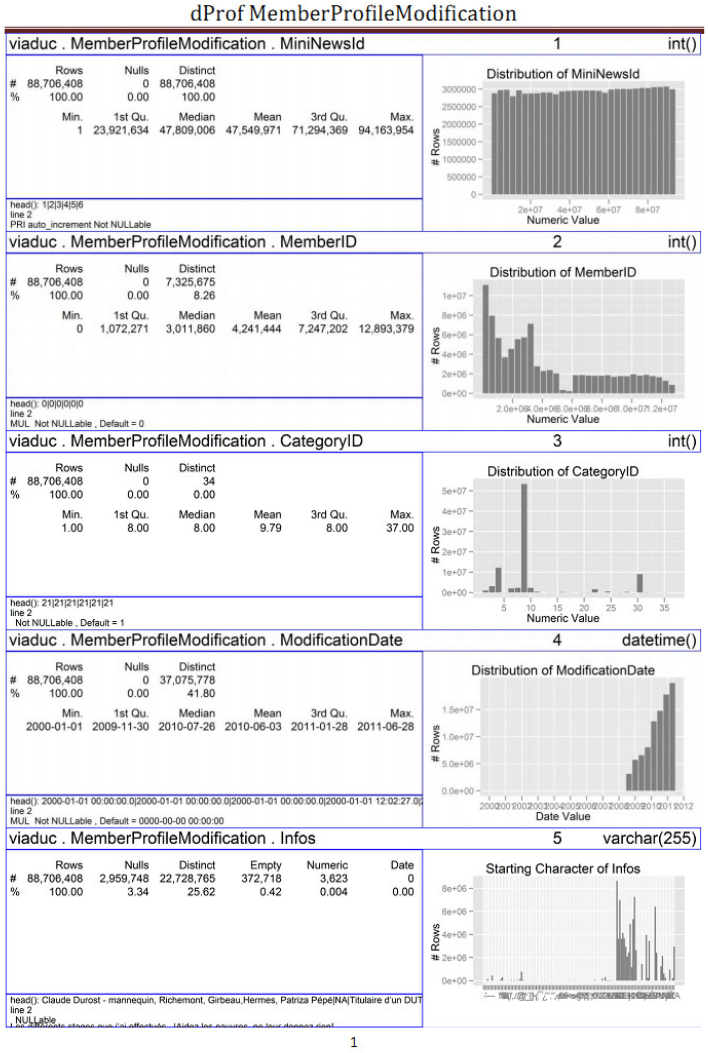

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Thanks!

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