After 40 years a Spreadsheet comes alive

In 1979, VisiCorp introduced VisiCalc – the first spreadsheet application, forever changing the way we use computers. The concept behind it is simple: a table where every cell can be linked to a formula calculating and recalculating its value based on the values of other cells. Changing the content of one cell caused a chain of recalculations of all the other cells that depend on it. This "magic" turned boring budget calculations into a fun game. Adding a brilliant implementation on a tiny 32K(!) computer and serious professionals started changing their attitude towards these silly little things called Personal Computers. Suddenly they turned from toys, to business tools. What previously took hours of work using a calculator, now could be done in only a few minutes. Spreadsheet quickly became a household name and virtually every personal computer sold had to have one. Now the software was driving sales of the hardware. Apple II became a best seller because it was the only computer on the market capable of running VisiCalc for 12 straight months.

Fast forward 40 years, with the advent of the Internet-Of-Things [IOT], Sparks Dynamics revisits the Spreadsheet concept with its latest software release, REXL (a module, part of ViewMaster application). It is a fully blown spreadsheet application (not a macro for Microsoft Excel™). It allows the linking of any cell with a real-world entity such as pressure, temperature, power transmitted by IOT sensors. As VisiCalc brought personal computing power to professional accountants, REXL brings the utility of IOT to production engineers packaged in a familiar and easy to understand environment. Receiving, processing and analyzing instantaneous data becomes as easy as calculating a family budget.

	C1	C2	C3	C4	C5	C6	C7	C8
R1	TAG	KW	Time	Comment	Lower	Medium	Upper	Delta
R2	KWT[1]	0.58	2020-03-1...	=TAG("KWT[1]")	0.58	0.58	0.58	0.00
R3	KWT[2]	126.32	2020-03-...		126.20	126.32	126.50	0.30
R4	KWT[3]	123.30	2020-03-10T16:47:53	Power ZR3	123.10	123.30	123.40	0.30
R5	KWT[4]	66.66	2020-03-10T16:47:47	Power ZR4 VSD	66.50	66.66	66.90	0.40
R6	Summary							
R7	Total KW	316.86	2020-0...	=SUM(R2C2:R5C2) ...ssor Power (KW)	316.38	316.86	317.38	1.00
R8	KW	126.32	2020-0...	...y single compressor	126.20	126.32	126.50	0.30
R9	Cost/KwH	$0.11		Rate per KW-H				

Figure 1. Special TAG function for accessing field sensors can be used along with standard functions such as SUM used to add the values in specified range of cells.

Live Data

Coupled with Sparks IIOT Services, REXL comes alive as soon as the user logs into the cloud. Special features and tools are added to enable access to remote IIOT data relayed by the Sparks Cloud [Figure 1]. Shown in the callout is the TAG function that links the cell to a particular field sensor. The value of this cell will be immediately updated as soon as the sensor issues a new reading. Standard SUM function among other cells will recalculate as new data comes in.

Trends Analytics

For in-depth trend analytics, REXL offers a tool that allows for the retrieval of historic data. A special set of functions define the time range, interval and tags to be retrieved. The range can be defined as static or sliding. For example, data can be retrieved in daily intervals for the last 7 days generating a 7-row table of daily average values. Shown in [Figure 2] is a table of year-long averages. This table will be filled up and updated each year.

	KWT[1]	KWT[2]	KWT[3]	KWT[4]	FLOW[5]	PSI[5]	SPW[5]	Total KW
2015-01-01T00:00:00Z	84.80	80.30	87.58	67.97	747.81	75.24	42.88	480.99
2016-01-01T00:00:00Z	61.06	81.47	81.15	69.59	1256.81	103.01	23.34	293.28
2017-01-01T00:00:00Z	65.43	54.24	82.95	64.14	1208.20	98.30	22.08	266.76
2018-01-01T00:00:00Z	37.05	121.00	122.01	78.18	1456.18	101.27	24.60	358.24
2019-01-01T00:00:00Z	53.32	121.06	119.09	82.36	1676.26	99.17	22.42	375.83

Figure 2. Access to historic data using table generator object. Year-average value for selected tags for last 5 years. Total KW is calculated cumulative value for average power of all units KWT[1]..KWT[4]

Reports and Presentations

For the relevant information within an organization, REXL provides the tools to build very informative live displays including gages, charts and indicators placing them directly on the spreadsheet. Grouping

them together with rich formatting options using a variety of fonts, styles and colors, REXL users can publish any selected area of the spreadsheet so that it can be visible to anyone with proper access to the given account using any internet browser on a computer or a smart phone. One might question how is it possible that REXL is running on my local laptop? It is possible once the entire REXL spreadsheet is published onto the Sparks Cloud server. Now the server will be updating it keeping numbers, reports and dashboards all current. That means that reports and dashboards will be showing the data in real-time.
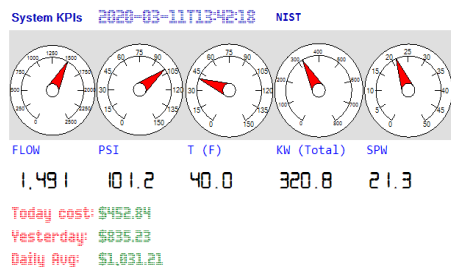
Rules and Alarms

ViewMaster's analytics engine allows users to create deterministic conditional rules. These rules will issue alarms based on complex logical expressions and time schedules to alert users of undesirable conditions that will affect the performance or reliability of production equipment.