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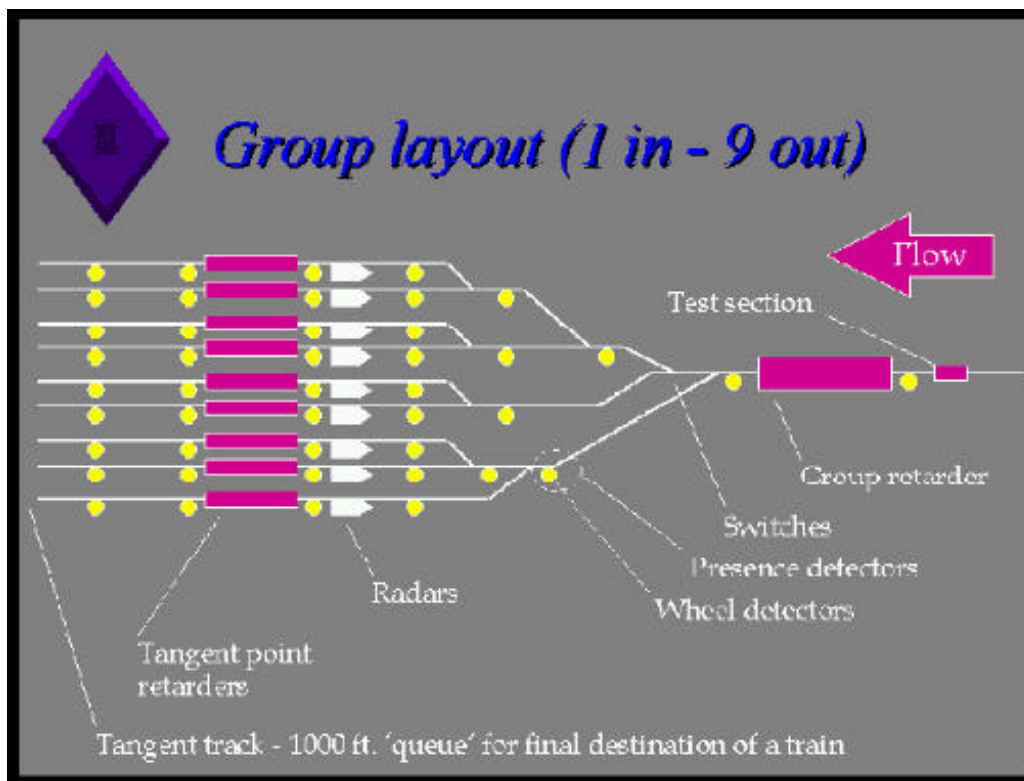
## Think & Do Featured Applications

### Railroad Classification Yard

#### A sortation and data integration application

The next time you vacation in Elkhart, Indiana be sure to stop by the Conrail railroad yard to see one of the biggest sorting systems in the world. At this yard they sort the incoming rail cars into outgoing queues for their final destinations. Cars are sorted by letting them go down a hill (gravity is the force at play here) and diverting their path into one of 72 outgoing tracks. Gravity gets them down the hump and the PC-based control system monitors their speed and controls braking (retarder is a braking device) and switches them to their final destination. There are usually many cars in motion simultaneously throughout the hump yard.

MODULAR DESIGN - A yard consists of 8 groups of 9 tracks each (for a total of 72 tracks out) with one PC dedicated to each group, sharing data over ethernet. A group looks like this:

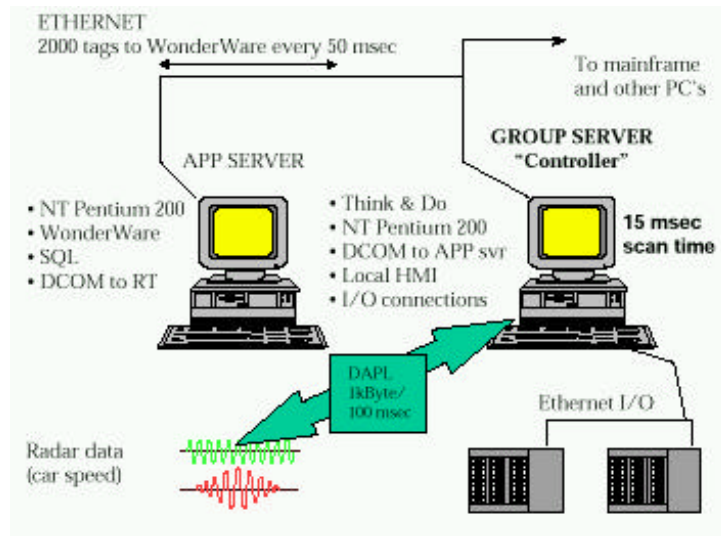


#### SOME OF THE HIGHLIGHTS

- OFF-THE-SHELF COMPONENTS - Control is done with a standard Pentium PC, ethernet network link to I/O and PC-to-PC communication, and a variety of off-the-shelf software packages such as Think & Do Flowcharts for control, WonderWare for HMI, DDE servers, etc.
- MULTIPLE I/O SYSTEMS I/O is based on a combination of **Automationdirect.com** Ethernet I/O and a high speed ISA bus data acquisition card.
- DATA ACQUISITION and CONTROL - Data acquisition card handles radar data coming from 9 radar systems (10us sampling rate on each channel - monitoring speed of cars) and filters it down to 1 Kbyte of data to flowchart control engine every 50msec. Some of this data is used for speed control

and the rest is archived via DDE to WonderWare.

- FLOWCHART LOGIC controls the process, (25 flowcharts, 1400 blocks, 288 inputs, 56 outputs, 15,000 integers, 3000 floats, 1200 timers, 328 arrays) with an interface to the data acquisition card and DDE server - scan time is 15 msec. Logic is very modular because of arrays, indexing and DO LOOP construct in flowchart language.
- MANY VARIABLES - There are many parameters that affect the algorithms which control speed - wind speed, car weight, number of wheels, type of car, temperature, humidity, number of cars in a cut , distance to couple, final destination, etc.



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