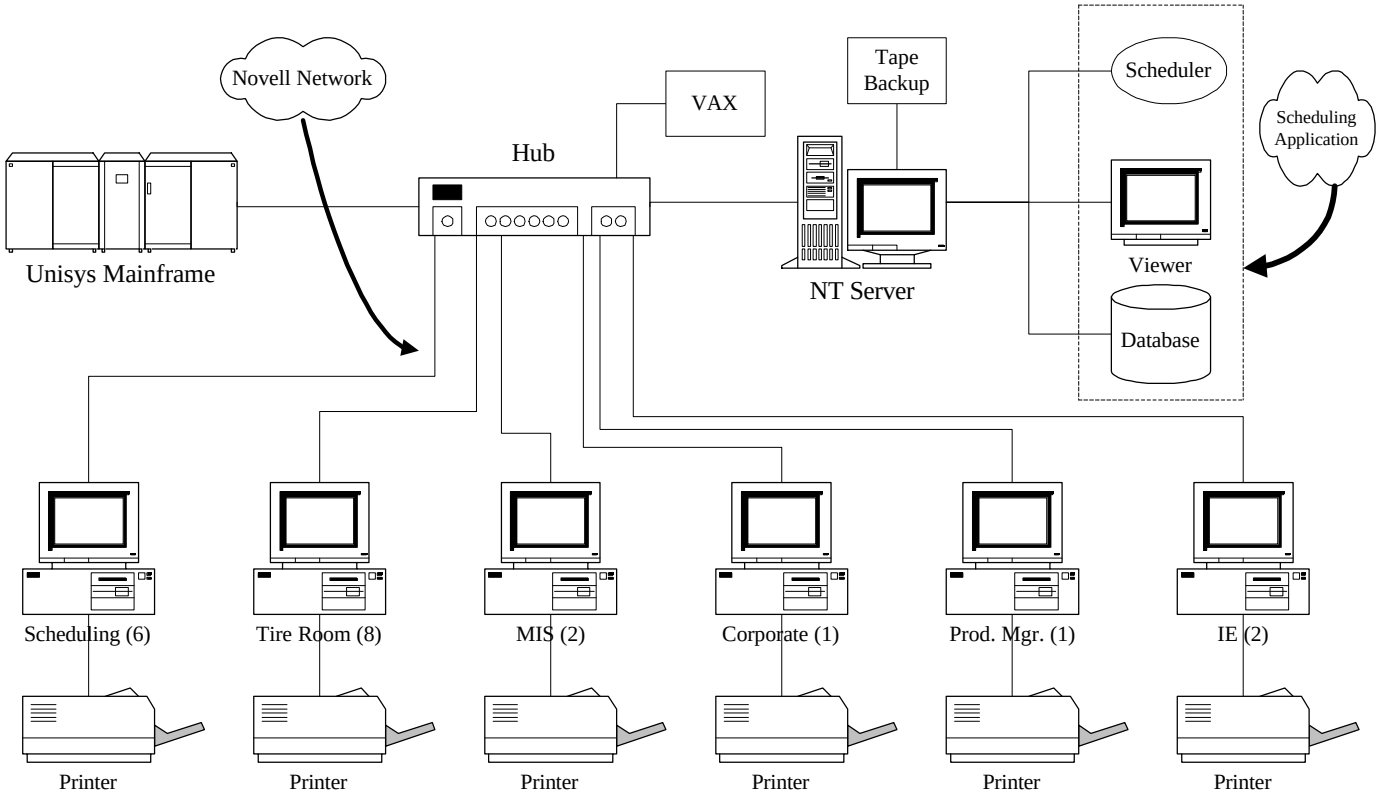
Tire Manufacturer

Findlay, Ohio

Facility Planning & Analysis Services

- Simulation Modeling
- Scheduling System Development
- GUI Development
- Database Development

Tire Building Scheduling Decision Support System
System Diagram



When a tire manufacturer was having difficulty with their existing production schedules, they decided to build a brand-new scheduling system, tailored to their needs. To create an accurate schedule, the scheduling system needed to interface directly with their Unisys mainframe to get real-time production floor data. The system was also required to interface with their VAX system to update the statistical

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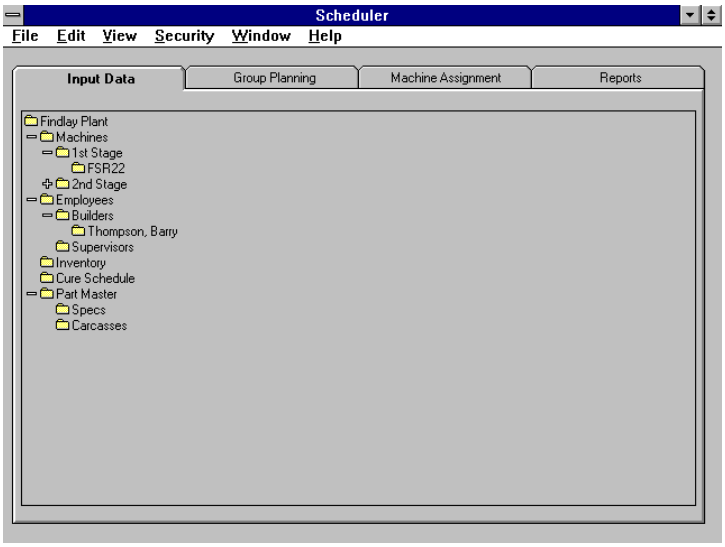

The automated scheduling system was designed to have a folder-type graphical user interface. The above screen capture illustrates how the scheduling system would appear at the beginning of a scheduling session.

As the complexity of the product mix increased, their ability to meet customer demand languished due to poor manually-produced production schedules. With an expected increase in the number of tire types being produced, the task of manually developing an "optimal" schedule for the tire manufacturing system became impossible. The tire manufacturer required assistance with developing a new automated scheduling system for their Findlay Manufacturing Plant. Although the new system was designed for the Findlay Plant, the client required that the system be configurable, to allow them to use it at all of their tire building plants. This led to extra complexity, because each plant added an extra degree of variability in the work force schedule, tire types, and equipment types. There were three possible solutions to develop the scheduling system:

- Purchase an *off-the-shelf* scheduling package
- Customize a scheduling system using an existing software tool base
- Create a scheduling system from ground zero using a standard computer language

To assist the team in determining which scheduling system would develop the best schedules, a simulation model was created. The simulation model was developed to execute several weeks of production, one shift at a time. This allowed the user to create an initial schedule, and then modify it as the simulation model progressed through the week. This flexibility also allowed the user to investigate how a given shift's schedule performs under varying production states. That is, a given schedule can be tested using varying work forces, equipment utilizations, starting conditions, etc. Using the simulation model, each of the three scheduling system development solutions were evaluated. Given the variability in the production facility and the cost of off-the-shelf scheduling packages, it was determined that creating a new scheduling system from ground zero was the most cost-effective solution.

The first step in developing a new scheduling system was to develop a design criteria document that describes both the functionality of the system and the user interface. The design team spent several weeks on site interviewing key system users and evaluating the current scheduling paradigm. The design team with the support of the client's Industrial Engineering Department developed a dual-level scheduling paradigm based on maintaining a common cycle inventory for the multiple tire groups. The first level of the scheduling paradigm used a dynamic programming model to optimally assign the number of machines to each tire group. The second level then develops the time-phased machine assignments of each tire using a heuristic-based expert system. Once the functionality of the scheduling system was validated, the design team turned its efforts to developing the user interface for the system. Over 70 windows were developed for the system, which included options for both manual and automatic data input data, varying work rules, and the ability to configure the expert system for each production plant. The proposed scheduling system was validated and is currently being implemented by the client's Information Systems Group.