



## **Case Study**

### **SoluSoft Forms Processing (FP)**

#### **Automated Scoring of General Assessment Test for Students in the US**



## **Introduction**

In response to state and federal (in the US) education reform acts and accountability requirements, most recently, the No Child Left Behind Act of 2001 (NCLB), national agencies, states, and large districts across the country have implemented far-reaching systems that reform educational standards and include large-scale assessments to monitor student achievement of those standards. Basic reform strategies emphasize the need for high academic standards describing what all students should know and be able to do and high-quality assessments aligned with those standards. States have developed and implemented assessment programs that correspond to curriculum standards and assess students in designated grade levels and subjects. Under NCLB, students in grades 3 through 8 plus 1 high-school grade must be assessed annually in reading and math, beginning in 2005-2006. Mandated science assessments at 3 grade levels and higher will begin in 2007-2008.

## **Challenges**

One of SoluSoft's customer combines both traditional and innovative measures in the design of large-scale assessment programs, most of which include multiple-choice, short-answer, open-response questions, and writing tasks for elementary, middle, high school, and college students. The customer and local educators are usually involved in the processes of test development, standard setting, scoring, and interpretation of results. The objective of this case study is to address the challenges faced by the customer in scoring of the assessment test papers that are returned after test administration.

The key challenges faced in the scoring process:

- To process vast number of answer sheets
- To Provide results in timely manner to meet Department of Education (DOE) deadlines
- To assure 99.9% accuracy of all student results
- To provide highly automated processing with minimum human intervention
- To provide scalable solution to meet peak processing
- To get cost effective solution

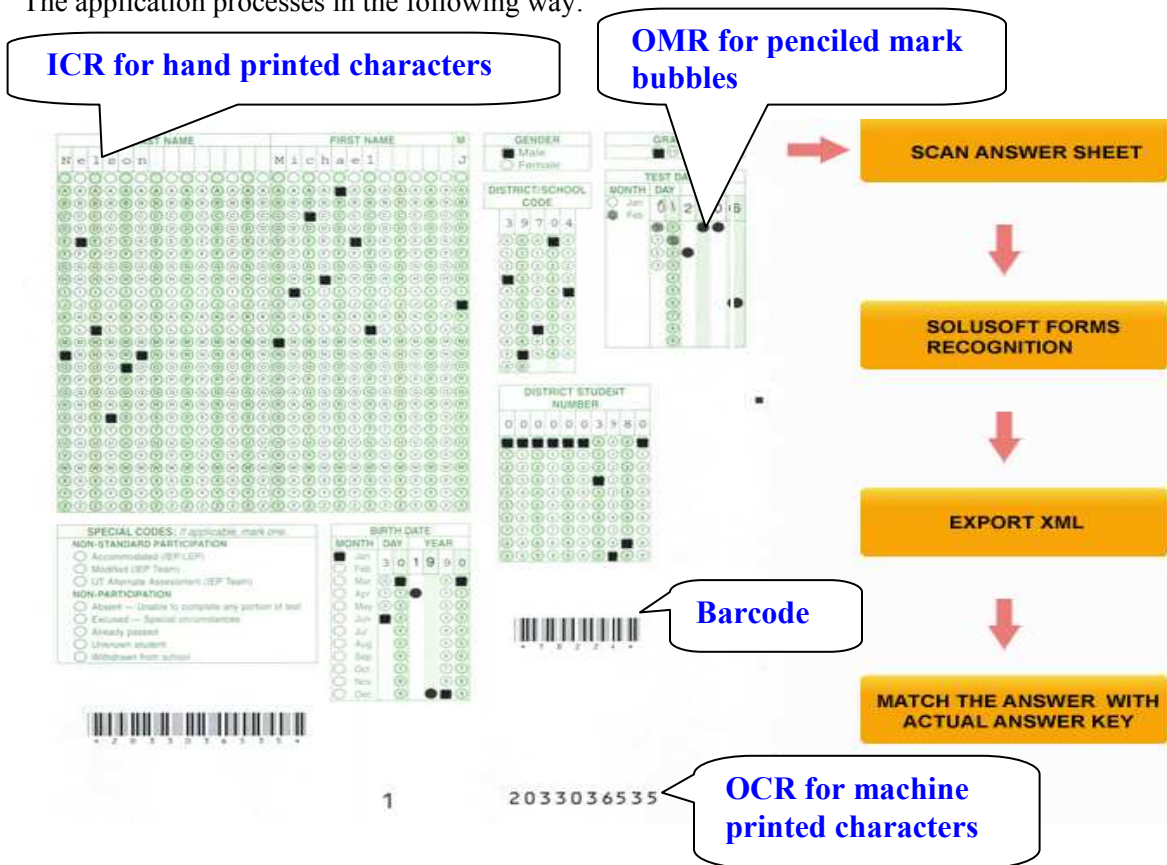
## **Kind of document to be processed**

Once the test development is completed, the end result is a student test booklet containing various content areas like Reading, Math, Science, etc. Each content area contains multiple test questions. The question could be in form of multiple-choice, short-answer, open-response, or writing. The first page of the booklet and the multiple choice questions has "bubble" areas to fill in the answers. The "bubble" area is a set of blank ovals or boxes that correspond to each question, usually on separate answer sheets of paper or underneath the question. Students use #2 (HB in Europe) pencils to mark their answers, or other information (student demographics), by darkening ovals areas. The student booklet also contains a bar code describing the serial number of the booklet. The serial number binds the student to the booklet. Each sheet of the booklet contains a page number and it is related to the configuration of bubble areas on each page.

## Solution

The customer has implemented automated scoring solution based on SoluSoft Forms Processing application to recognize machine printer character using Optical Character Recognition (OCR), penciled bubbles using Optical Mark Recognition (OMR), handwriting using Intelligent Character Recognition (ICR) & Barcode technologies off the student test booklet. Students' booklets are cut in to sheets and scanned by high speed scanning systems that use Kodak 840 scanners to create JPEG image files. These image files are then processed by SoluSoft Forms Recognition Processor that is calibrated to recognize various booklets types and the contents of each booklet type including bubble, bar-coded, and machine printed areas. The following diagram depicts the process.

The application processes in the following way:



## Return on Investments

<b>SoluSoft</b>		
<b>ROI Analysis for Forms Processing Application</b>		
<b>SoluSoft v/s Others</b>		
<b>Particulars</b>	<b>SoluSoft</b>	<b>Others</b>
No. of Sheets scanned	1,000,000	1,000,000
Initial Investment	USD 5,000	USD 8,000
Cost of Processing (per sheet)	USD 0.10	USD 0.16
Net processing cost	USD 100,000	USD 160,000
<b>Benefit to client</b>	<b>USD 60,000</b>	
No of days for processing	12	20
<b>No of days saved</b>	<b>8</b>	

### Advantage of SoluSoft Solution:

- Lower initial investment
- Lower operating cost
- Single recognition application for Barcode, OCR, OMR, MICR and ICR
- Form drop out improves recognition by eliminating unnecessary lines, combs, distractions, colors
- Automatically applies a scaling factor to rationalize scanned forms to the template images
- Supports single and multi-mark recognition with a 99.9% accuracy
- Ease of use substantially reduces man-hours to configure and operate
- Highest functionality at the lowest ongoing cost of ownership

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