IRI
Data Protector Suite

Data Protector Suite 2022

IRI FieldShield
PII / PHI Classification & Masking

IRI DarkShield
Unstructured Data Search & Security

IRI CellShield
PII / PHI Search & Mask in Excel

IRI RowGen
Smart Test Data Generation

database
TRENDS AND APPLICATIONS
TREND-SETTING PRODUCTS

IRI, The CoSort Company

Vendor Background

- Specializing in fast data management and data-centric security

- Privately owned and profitable since 1978

- Sales and support in more than 40 cities worldwide

- Organically grown, shared metadata and Eclipse IP stack

- Featured in: CIO Review (top GRC and Compliance vendors); DBTA; Gartner Market Guide to Data Masking Tools; and in the QY, Markets & Markets, and Research & Markets *forecast reports* on Data Masking, DB Security, Data Classification, Data Governance

IRI
Total Data Management

IRI Data Masking Reference Customers & Partners

Most IRI data masking customers profile and protect PII in RDBs, flat files and Excel sheets on premise, or in the cloud. Recent engagements also involve NoSQL DBs, documents, images, and EDI and log files. Streaming and Hadoop data sources, plus faces, are also supported. Entities include:

Selected Recognitions of IRI in the Data Governance and Security Industry

- BARC Technology Map for Data Governance 2021 (IRI Voracity)
- Bloor Research Test Data Management InBrief
- CIO Applications: Top 25 GRC Technology Providers
- CIO Review: 20 Most Promising Compliance Technologies
- Computerworld Germany (IRI FieldShield)
- DBTA: Trendsetting Products (IRI DarkShield)
- Forrester Research Now Tech: Data Masking Q1'2021
- Gartner Market Guide for Data Masking (2017-2021)
- Global Data Governance Market Size & Analysis through 2026
- Global Data Masking Market Size & Forecast verified 2020
- Insight Partners - Data Classification Market to 2027
- Insight Partners - Test Data Management Market Outlook to 2027
- Markets & Markets - Data Governance Market to 2024 - Visionary Leader
- Markets & Markets - Data Masking Market Forecast to 2022
- Outlook Series: The Case for Data Masking
- QY Research - Global Test Data Management Market to 2025
- Privacy & Data Security Law Journal
- Research & Markets - DB Security Market to 2022

IRI
Total Data Management

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Data Protector Suite

TEST DATA MANAGEMENT

IRI Voracity — An Insatiable Appetite for Data

DESIGN
- erwin
- DataSwitch
- 4GL Scripts
- IRI Workbench
- ValueLabs TDH

DISCOVER
- ERD
- Profile
- Search
- Report
- Classify

SUBSET
- RDBs
- Flat Files

MASK
- RDBs
- NoSQL
- Images
- Files/Logs
- PDF & Word
- Excel Sheets

SYNTHESIZE
- RDBs
- EDI Files
- Flat Files
- DataVault 2.0
- Excel Sheets
- Voracity ETL Preview

DELIVER
- Actifio
- Eclipse
- Windocks
- Commvault
- ValueLabs TDH
- Cigniti Blueswan

DEVELOP
- API
- GitLab
- Jenkins
- Bitbucket
- Azure DevOps
- AWS CodePipeline

IRI FieldShield — PII / PHI Classification & Masking
IRI DarkShield — Unstructured Data Search & Security
IRI RowGen — Smart Test Data Generation
IRI TDaaS — Test Data as a Service

IRI FieldShield — PII / PHI Classification & Masking
IRI DarkShield — Unstructured Data Search & Security

Data Classification

Pattern Search · NER / NLP · String Search

Data Anonymization
- Encryption (& FPE)
- Pseudonymization
- Redaction
- Erasure/Deletion
- Scrambling
- Encoding
- Hashing
- Tokenization
- Blurring
- Bucketing
- Shifting
- Randomization

Image Bounding Box · Data Profiling · Fuzzy Search · Facial Detection · Re-ID Risk Scoring · Path Filters · Audit Logs & Dashboards · Facial Recognition

IRI CellShield — PII / PHI Search & Mask in Excel
IRI DMaaS — Data Masking as a Service

IRI Workbench — Ergonomic Job Design Built on Eclipse

IRI CoSort — Sort, Transform & Report

IRI FieldShield — PII / PHI Classification & Masking
IRI NextForm — Data File & Database Migration
IRI RowGen — Smart Test Data Generation
IRI DarkShield — Unstructured Data Search & Security

SortCL

IRI Voracity — An Insatiable Appetite for Data

IRI — Total Data Management

IRI Data Manager Suite

IRI CoSort
Sort, Transform & Report

Speed or replace legacy sorts, and batch/ETL/SQL transforms

- Filter, sort, join, aggregate, pivot, cleanse, lookup, calc, etc.
- Map, migrate, federate, and replicate data from 150 sources
- Segment data, capture changes, report details / summaries
- Analyze changing dimensions, support complex transforms

IRI FACT
Fast Extract for DBs

Speed RDBMS unloads for archival, migration, reorg, and ETL

- Extract tables to flat files in parallel using SQL queries
- Convert and re-format to change data types and layouts
- Create the data definitions for IRI software and DB loads
- Pipe to CoSort and DB loaders for faster reorg and ETL

IRI NextForm
Data, File & Database Migration

Unlock data and move between apps, DBs, and platforms

- Convert, federate, remap, and replicate legacy data
- Migrate data between databases and create new tables
- Change file formats, data types, and endian conditions
- Find, extract, and structure data in unstructured sources

IRI RowGen
Smart Test Data Generation

Prototype DBs and ETL, stress-test, outsource, benchmark

- Use real data models and formats, not production data
- Combine generation and selection, create new formats
- Preserve referential integrity and frequency distributions
- Feed test DBs, files, and custom reports simultaneously

IRI Voracity
An Insatiable Appetite for Data
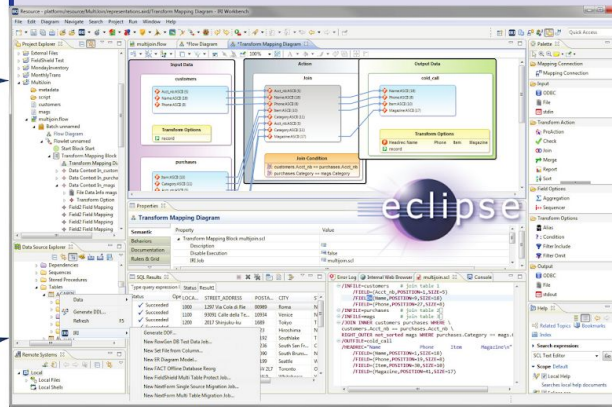
Consolidate tools and tasks to process, protect, prototype, present

- Discover, define, and manage data in legacy and new sources
- Combine data integration, migration, governance, and analytics
- Exploit CoSort or Hadoop engines for optimum throughput
- Leverage Eclipse familiarity, functionality, and extensibility

IRI
Total Data Management

IRI Data Protector Suite

IRI FieldShield
PII / PHI Classification & Masking

Static and dynamic masking of structured data sources

- Search, profile, and classify sensitive data in DBs and files
- Encrypt, hash, redact, pseudonymize, randomize, tokenize
- Apply cross-table rules to save time and referential integrity
- Score re-ID risk and audit your jobs to verify compliance

IRI CellShield
PII / PHI Search & Mask in Excel

Discover and de-identify PAN/PHI/PII in Excel spreadsheets

- Define or re-use patterns to search for sensitive data
- Locate, report, and open all found ranges in the LAN
- Click to encrypt, mask, or pseudonymize data directly
- Auto-log protections to verify privacy law compliance

IRI DarkShield
Unstructured Data Search & Security

Discover, deliver, and delete sensitive information everywhere

- Find PII in LAN and cloud sources using multiple methods
- Simultaneously de-identify, remove, or report those values
- Mask text, MS, PDF, Parquet & image files + LOBs & NoSQL
- Comply with the right to erasure, portability, or rectification

IRI DMaaS
Data Masking as a Service

Leverage expert data privacy engineers to find and mask PII

- Avoid learning curves, software expenses and staff diversion
- Reduce risk by agreement, monitored VPN, or secure cloud
- Use operational logs for reporting and compliance audits
- Select from competitive hourly, daily or project rates

Sources

Big Data Platforms & Streams
cloudera, MAPR, Hortonworks, Pivotal, Spark, HIVE, NETEZZA, MQTT, kafka

Call Detail Records
ASN.1 BER, JER, OER, PER, XER

Cloud & SaaS
Azure, Amazon S3, SharePoint, Google Cloud Storage, HubSpot, Marketo, eloqua, salesforce

Databases
ORACLE, IBM DB2, MySQL, Microsoft SQL Server, PostgreSQL, TERADATA, mongoDB, elasticsearch, snowflake, cassandra, amazon DynamoDB, VERTICA, SYBASE, ALTIBASE, SAP

Files
COBOL, CSV, Fixed, LDIF, LS-RS-VS, MF-ISAM, MFVL, Pipes, VB, Vision, XML, etc.

Mainframe
Adabas, Datacom, IDMS, IMS, ISAM, Pick, Unidata, VSAM, etc.

Semi & Unstructured
PDF, XLS, W, JSON, txt, Parquet, HL7, X12

Images
BMP, DICOM, GIF, JPG, PNG, TIFF

Other Sources
Custom Apps, ETL/ELT Tools, Packaged Apps, Web Logs

DISCOVER
Data Classification
Dark Data Search
DB & File Search
DB & File Profiling
ER Diagramming
Metadata Definition
Metadata Forensics

INTEGRATE
Slowly Changing Dimensions
Public/Private Mashups
Change Data Capture
Fast DB Un/Load
Data Federation
One-Pass ETL

MIGRATE
Incremental Replication
Data & File Types
Endianness
Databases
JCL Sorts
ETL Jobs

GOVERN
Data Quality
Data Masking
DB Subsetting
Re-ID Risk Scoring
Data Reconciliation
Test Data Synthesis
Data & Metadata Lineage

ANALYZE
IoT Feeds
Embedded BI
Data Wrangling
Cloud Dashboard
Predictive Analytics
Clickstream Analytics
In Datadog, KNIME & Splunk

IRI Voracity
An Insatiable Appetite for Data

DESIGN
Wizards with Rules
Graphical Dialogs
Scripts with Outlines
Metadata Form Editors
Workflow/Mapping Diagrams
DataSwitch No-Code
Erwin Mapping Manager

DEPLOY
CoSort CLI/API
MapReduce 2 (Grid)
Spark (In-Memory)
Storm (Streaming)
Tez (Batch)
CD/CD, Java, SQL, YARN
Eclipse or Any Scheduler

Targets

Big Data Platforms & Streams
cloudera, MAPR, Hortonworks, Pivotal, Spark, HIVE, NETEZZA, MQTT, kafka

BI & Analytic Tools
SAP BusinessObjects, DATADOG, IBM COGNOS, MicroStrategy, ORACLE BUSINESS INTELLIGENCE, R, Qlik, splunk, Spotfire, cubeware, KNIME, Power BI, tableau

Cloud & SaaS
Azure, Amazon S3, SharePoint, Google Cloud Storage, HubSpot, Marketo, eloqua, salesforce

Custom Reports
Detail & summary reports

Databases
ORACLE, IBM DB2, MySQL, Microsoft SQL Server, TERADATA, mongoDB, elasticsearch, snowflake, PostgreSQL, cassandra, amazon DynamoDB, SYBASE, VERTICA, SAP HANA

Files
ASN.1, COBOL, CSV, Fixed, JSON, LDIF, LS-RS-VS, MF-ISAM, MFVL, Parquet, VB, Vision, XLS/X, XML

Other Targets
Custom Apps, Data & SpreadMarts, ETL/ELT Tools, Federated Views, Packaged Apps, DB Clones, DevOps

IRI
Total Data Management

IRI Data Masking Tool Architectures

IRI FieldShield
PII / PHI Classification & Masking

Architecture

Job Designers

IRI Workbench Built on Eclipse Any Text Editor	DataSwitch, erwin ValueLabs TDH Commvault, Windocks	IRI "Sandkey" API IRI "Gulfstream" API

Runtime Engines

VGrid Gateway to Hadoop	Other Programs	IRI SortCL
MR2, Spark Storm, Tez	(SQL, Java, C, PowerShell, etc.)	CoSort / DarkShield / Nextform / RowGen
		FieldShield

Sources & Targets

HDFS — RDBMS NoSQL — File Systems — Pipes — Cloud Apps
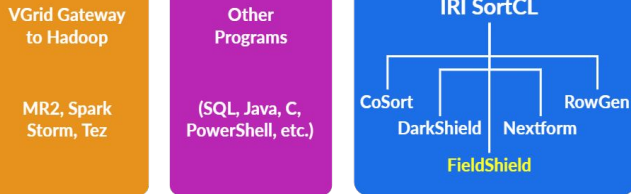
BI & Analytic Tools — Streams — APIs — Brokers — Custom Reports

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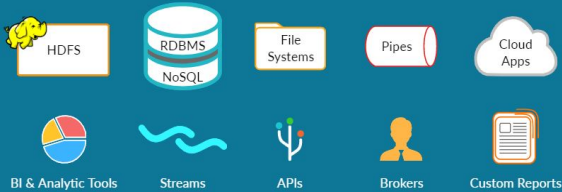
Both structured and unstructured data discovery functions -- including classification, search, and metadata creation -- are performed in IRI Workbench data discovery wizards.

Static data masking (SDM) jobs are usually built in IRI Workbench, while user-specific dynamic data masking (DDM) is available in multiple options (see matrix on slide #27).

Voracity data manipulation and masking jobs use the IRI CoSort (SortCL) engine on commodity LUW hardware, on premise or in the cloud. No database or cloud API is needed. This reduces runtime overhead, administrative complexity, and risk. The executable is also metadata-compatible with, and masks within data integration, cleansing, and reporting jobs, too.

Finally, no server framework is required to orchestrate jobs. This fosters more granular allocation and tuning of resources, and the sharing of metadata artifacts.

IRI DarkShield
Unstructured Data Search & Security

Architecture

Front-Ends

IRI Workbench Built on Eclipse	JRE CLI For Batch Jobs, CI/CD (DevOps)	RPC API For Apps & Web Services

Back-End

Search Matchers	IRI SortCL
Data Class Discovery Methods / Data Rule Masking Functions	CoSort / RowGen / FieldShield / Nextform
	DarkShield

Sources & Targets

HDFS — RDBMS NoSQL — Text Files — Pipes — Cloud Storage

Images — Streams — APIs — Web Apps — Documents

IRI Total Data Management
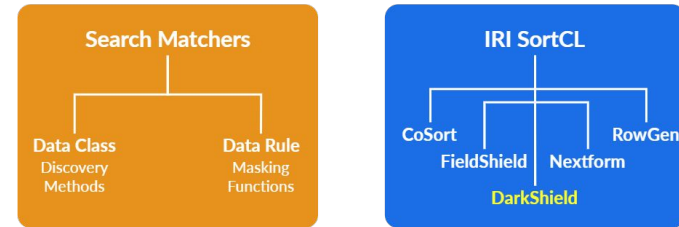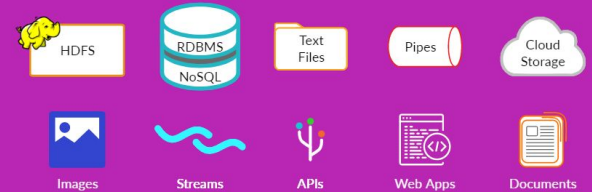
IRI Voracity Communication & Networking Architecture
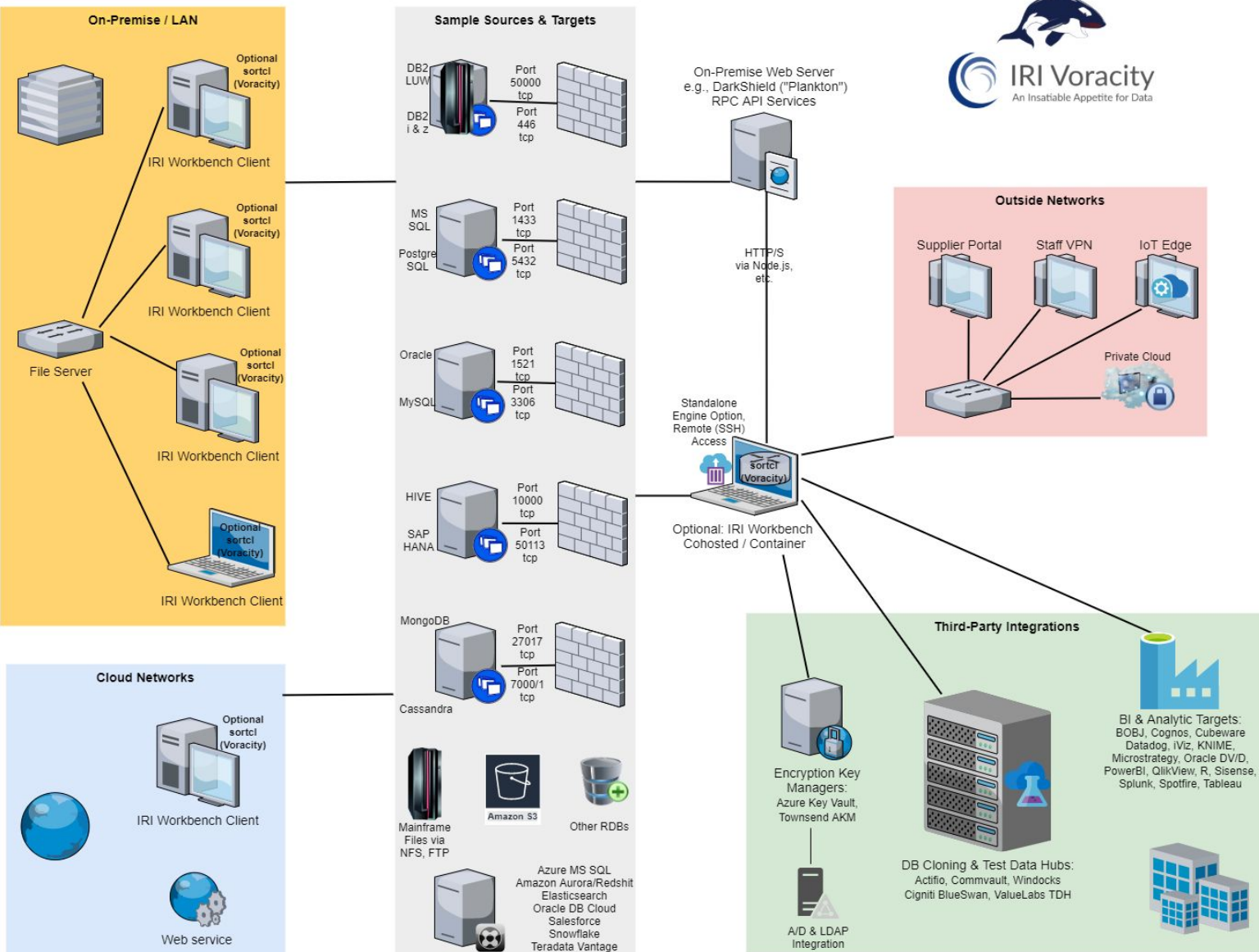
Hardware Prerequisites

For x86 systems, a minimum configuration for Workbench would be 4GB of RAM and 10GB of free disk space, after the installation of any VMs, DBs, etc. However, 6GB and up works best for each system to accommodate multiple database connections and table parsing for metadata and job definition.

For schemas with hundreds of tables to enumerate, as much as 64GB of RAM could be appropriate for the Workbench machine(s) where RDB-related jobs are built.

IRI also recommends where possible the co-location of the licensed back-end (SortCL executable) on or within close network proximity to database source or target servers for performance reasons, particularly if there are known network bottlenecks. Data maps, masks, munges, and mines essentially at movement speed, so consider network and I/O resources.

IAM/RBAC Now & Later

Today, you can assign permissions via encryption keys for select decryption, and: to data (file) sources, IRI masking programs (sortcl.exe), and the scripts they run (spec.fcl) in LUW file systems using central LDAP/AD settings. You can optionally control them via Apache Directory Studio in IRI Workbench:
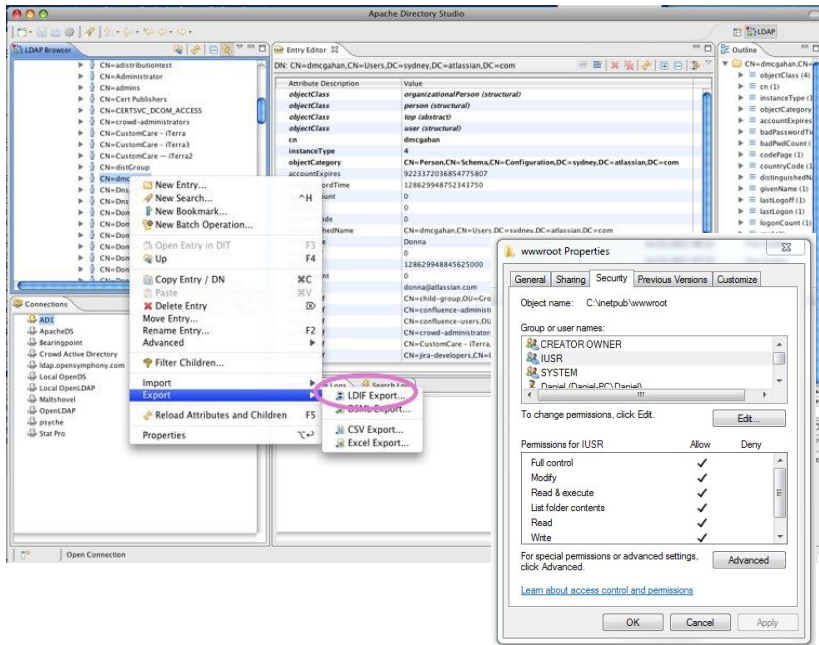
Soon, the IRI client/server governance system illustrated on the right will all you to assign and enforce RBACs to the same elements above, **and** to more granular elements like field names (mapped from data classes), functions, and perhaps specific data values (or ranges of values).
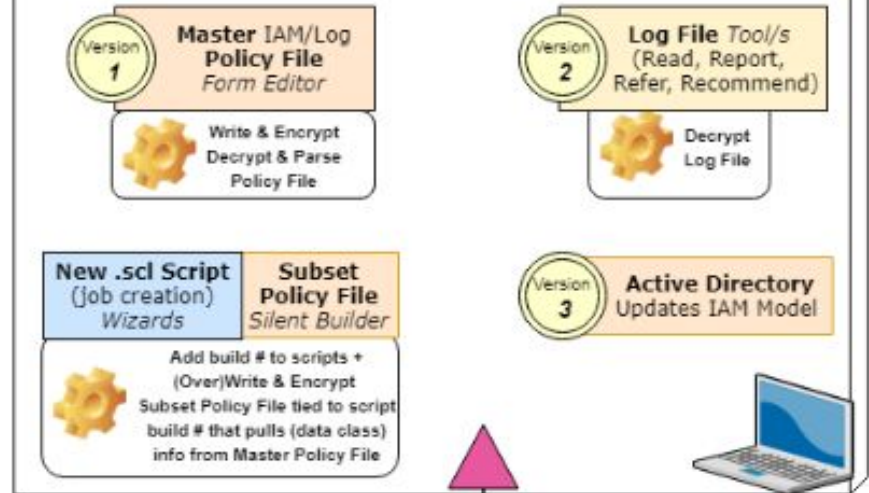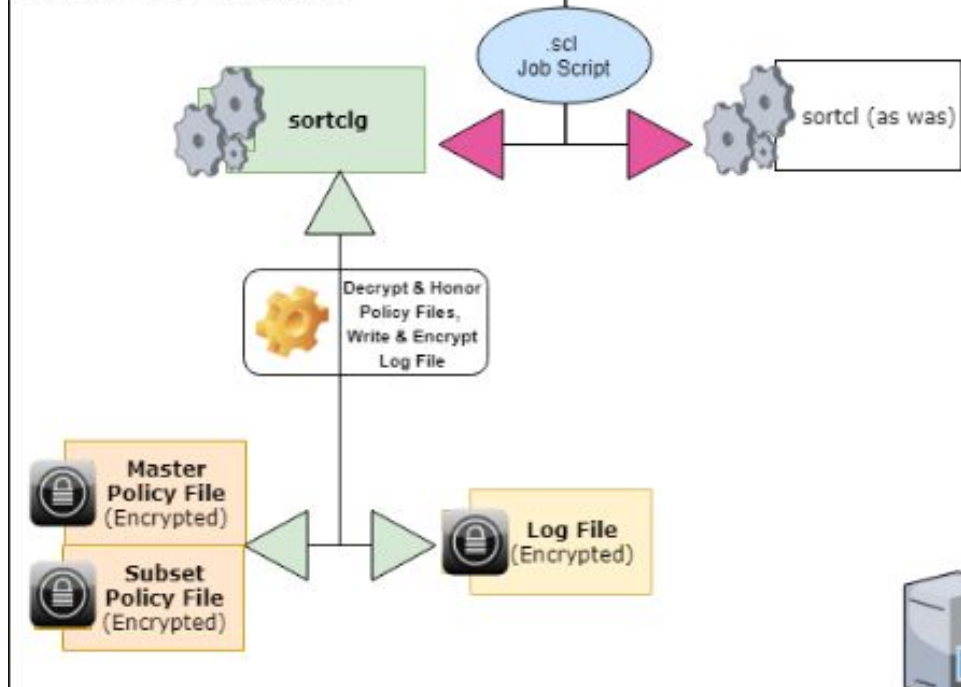
Cloud Data & Systems Support

FieldShield can read/mask/write data in cloud DBs like Oracle 19c, Snowflake, MS SQL in Azure, AWS Redshift, etc. via J/ODBC, *plus* URLs & message queues.
DarkShield supports files in S3, GCP and Azure Storage, plus any RDB, 9 NoSQL DBs, and SMB-tied cloud drives like Dropbox and Sharepoint. **Both** operate on-premise or in the cloud, on bare metal shapes or VMs running Windows, Linux or Unix.
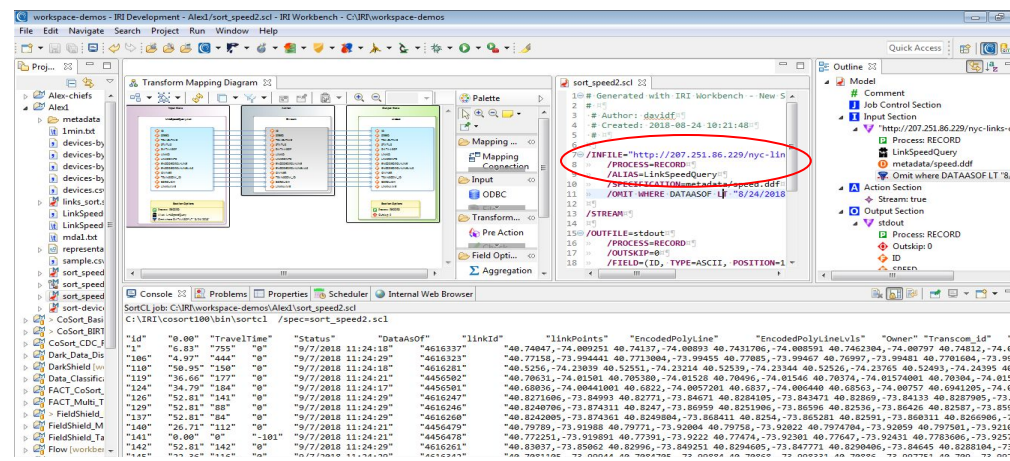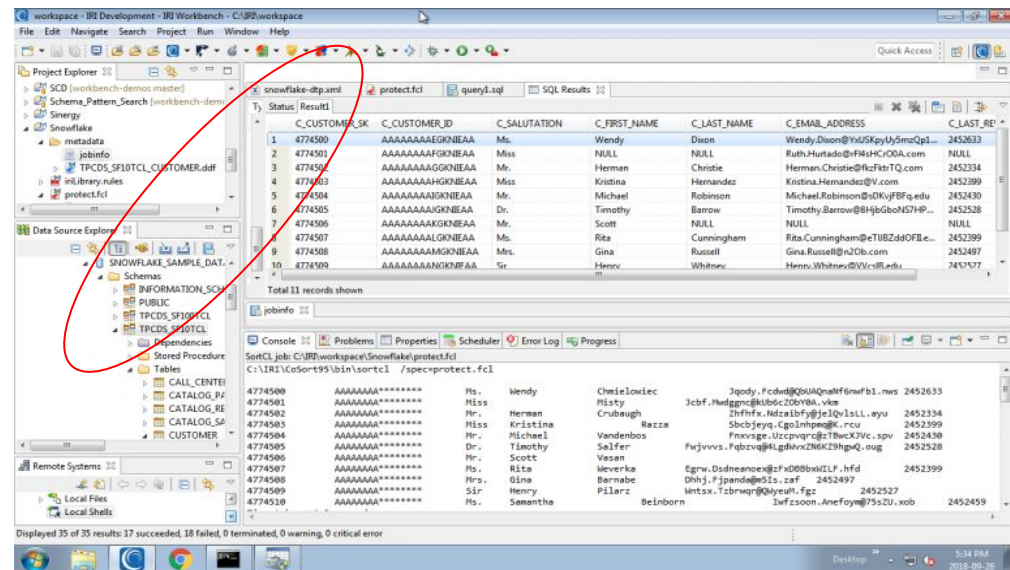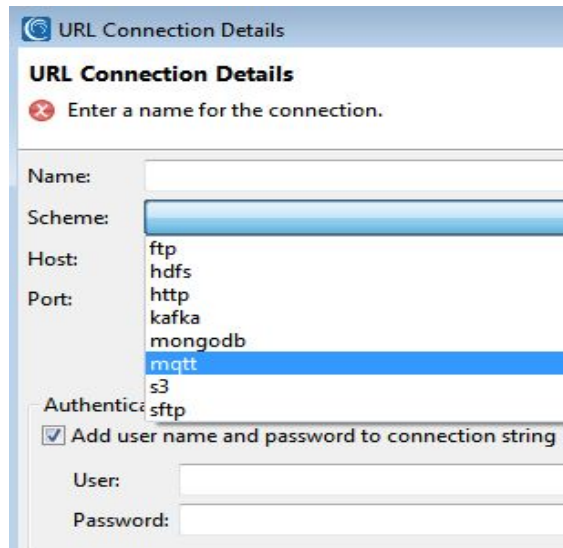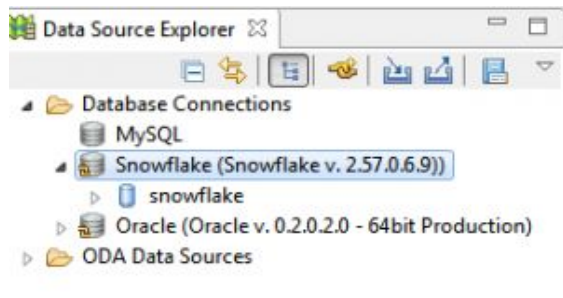
Metadata Integrations

1. Voracity tooling *consumes* metadata from any structured source for data classification, profiling, search, de-ID, ETL etc.
2. FieldShield & RowGen job scripts also *produce* metadata for several **DB load utilities** in multi-DB masking & test data jobs.
3. Their data definition file metadata can also be *exported* (e.g. target field layouts) in CSV for catalog tools like **Collibra**.
4. DarkShield reads **attribute** metadata about source files, and produces artifactual metadata from its search and mask ops and it can auto-forward or populate Splunk ES with that information for analysis, dashboarding, or adaptive responses.
5. **MIMB, erwin, DataSwitch** and **ValueLabs TDH** hub and feed FieldShield DDF and .FCL specs from external metadata:

Bridge Mapping

Meta Integration Repository (MIR) Metamodel (based on the OMG CWM standard)	"IRI CoSORT SortCL Data Definition File" Metamodel IriCoSort	Mapping Comments
Attribute	/FIELD	
Comment		# Comments in the DDF file
Description		# Comments in the DDF file
Name	field name (if physical name is not specified)	
PhysicalName	field name	
Position		
DataType	Data Type name	
Length	Field length	
Scale	Field scale	
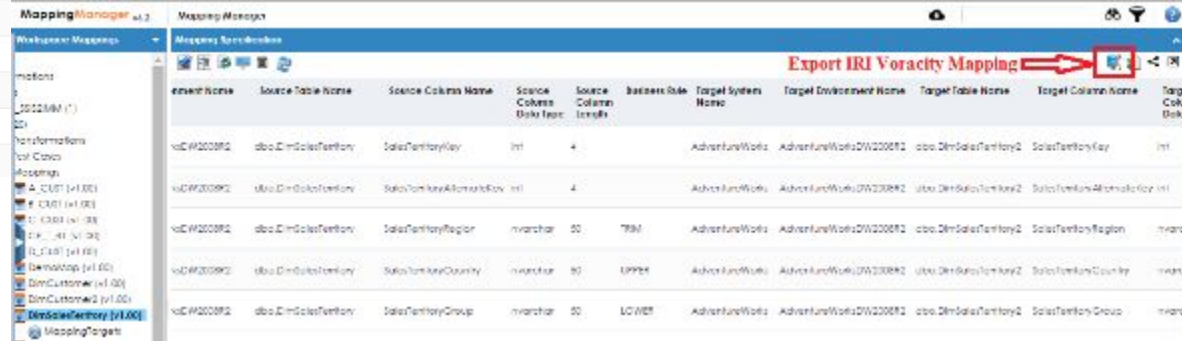
6. All IRI metadata -- including data source/target layouts, job/task speci and batch files, worfklows and metamodels, discovery configurations, search matchers and masking rules -- can also be team shared, secured and version controlled in **Git** et al
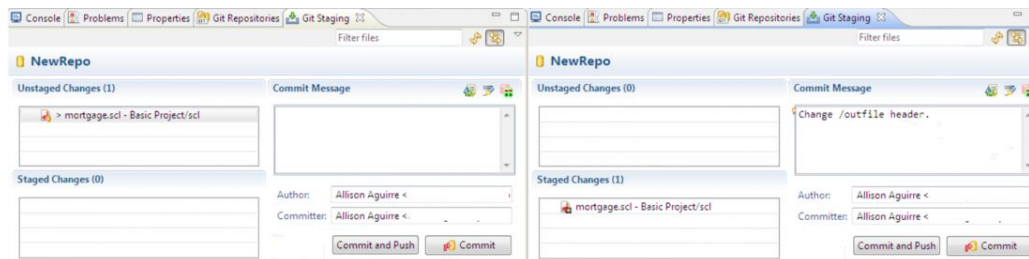
Data Sources (Standard)

Acucobol (MF) Vision	ESDS	MF- & RM-ISAM	Tibero (FACT)
Altibase (FACT)	Excel	MF Var. Length	Teradata
ASN.1 CDRs	HL7 (DS)	MySQL	Text
C-ISAM	HSQLDB (WB)	Oracle	TSV
CLF web logs	IDX 3, 4 & 8	PDF (DS)	UTF-8 & 16
CSV	Informix	PostgreSQL	Variable Block
DB2 (UDB)	Ingres	Record Sequential	Variable Sequential
DB2 for i5/OS	LDIF	RTF (WB)	VSAM MVS (UniKix)
DB2 for z/OS	JSON	SQL Anywhere	Web Services
Delimited	Line Sequential	SQL Server	Word (DS)
Derby (WB)	MariaDB	SQLite	X12 (DS)
ELF web logs	MaxDB	Sybase ASA/E & IQ	XML

FACT: requires IRI Fast Extract (FACT)   *DS*: requires IRI DarkShield
WB: requires IRI Workbench, the free Eclipse GUI for FieldShield, etc.

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Data Sources (Legacy)

Access	D3	GA-Power 95, R91	K-ISAM	Pathway	RMS
Adabas	Datacom	Gemstone	Knowledgeman	PDS	Reality/X
Advanced Pick	Dataflex	GENESIS	KSDS	PervasiveSQL	RRDS
ALLBASE	Db4o	Gigabase	Lotus	Pick/Pick64+	Sequoia
Alpha5	dBase	H2	Manman	PI-Open	SFS (VS*)
Amazon RDS	Desktop Adapter	IDMS	Mentor / pro	Powerflex	Sharebase
Azure	DL/1	IDS	MO	Powerhouse	Supra
BizTalk	DSM	Image	Model 204	Progress	Terracotta
Cache	Enscribe	IMS	Mumps	QueryObject	Total
Clipper	Enterprise Adapter	Interbase	MyBase	rBase	Ultimate
Codasyl	FileMaker	Intersystems	Netezza	R83	UltPlus
CorVision	Firebird	ISM	NonStop SQL	Rdb	Unidata
ConceptBase	Focus	Jasmine	ObjectStore	REALITY	Universe
D-ISAM	FoxPro	JBase	Paradox	Red Brick	VSAM VSE

These sources are typically only accessible via IRI partner (SoftwareAG-CONNX) J/ODBC drivers.
*IBM/Encina SFS files should be supported when written in COBOL using RECORDING MODE IS VARIABLE

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Data Sources (Modern)

Amazon EMR Hive	DynamoDB	Redis & Solr	Parquet files
Amazon RDS	ElasticSearch	MarkLogic (XML)	Pivotal Greenplum
Apache Cassandra	Google BigQuery	MongoDB	Pivotal HD Hive
Apache Hadoop Hive	Google BigTable	MS Dynamics CRM	SAP HANA
Azure CosmosDB	Hortonworks Hive	MS SQL Azure	Salesforce.com
Cloudera CDH Hive	Hubspot	Oracle Eloqua	Snowflake DB
Cloudera Impala	Kafka Connect	Oracle Cloud DB	Spark SQL
Database.com	MapR Hive	Netezza	Vertica DB

IRI FieldShield finds and masks structured RDB data on-premise, or in HDFS, AWS, Azure, GCP or OCI, **plus**: data in flat files (which can also be in S3 buckets or Hadoop), as well as ASN.1 CDRs, MF-ISAM or Vision fies, and Excel sheets. *IRI DarkShield* supports RDB and flat file data, too, **plus**: semi- and unstructured data in static or streaming text, log and EDI formats like JSON, HL7, X12 and XML; C/LOB columns in RDBs; Excel, PDF, and Word documents (including PII in their embedded images); NoSQL DBs; and, image files (BMP, DICOM, GIF, JPG, PNG and TIFF). The DarkShield API can run on premise or in the cloud, and read/mask/write PII from/to files in AWS S3 buckets, Azure BLOB, GCP Storage, or SharePoint (OneDrive). *IRI CellShield* only supports Excel (XLS/X), and works inside Excel, on-premise or in Office 365.

IRI
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IRI FieldShield
PII / PHI Classification & Masking

IRI Data Protector Suite

Sensitive Data Classification and Search Wizards

To facilitate data masking, IRI FieldShield includes: PII definition (cataloging through data classes); discovery through string (literal or dictionary), pattern, and fuzzy-logic searches; statistical reporting; and, automatic metadata creation.

Fit-for-purpose GUI wizards deliver:
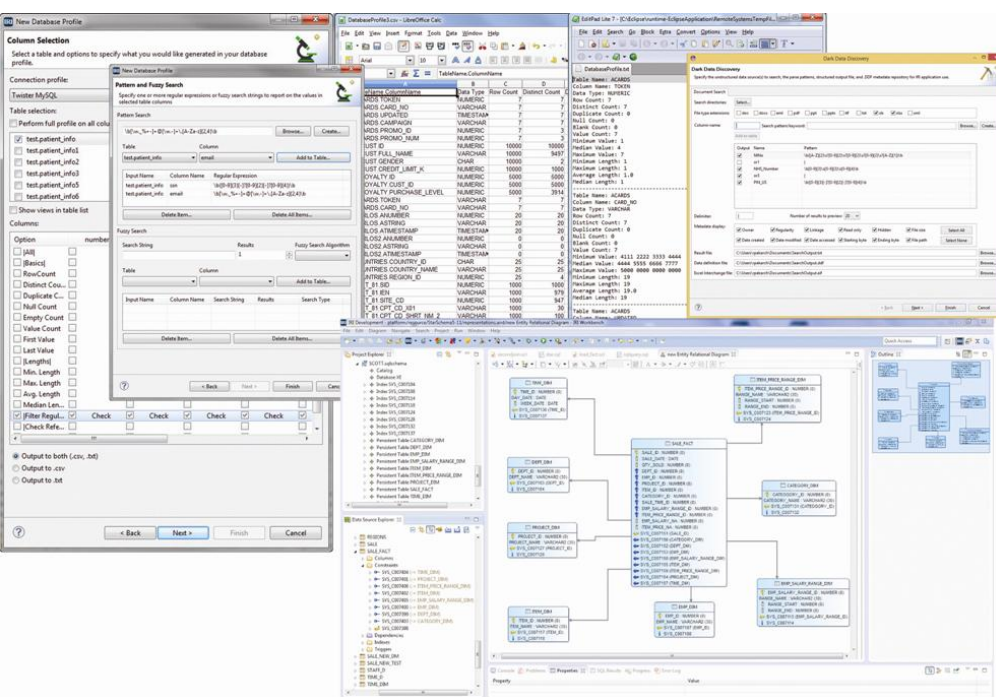
- DB and file data classification, with search and masking rule matchers
- DB profiling, ERDs, and table searches
- Flat-file profiling and value searches
- Data class searches through schema and directories for bulk discovery
- Metadata discovery and definition
- Dark data search and structuring, with metadata reporting (see DarkShield)

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Search Result Reports, Dashboards & Exports

In addition to report-formatted and machine-readable outputs from PII search operations in IRI Workbench, FieldShield users can also see details at a glance in digital displays, or feed that data to tools like Splunk Enterprise Security and Datadog for analytics and action-taking:
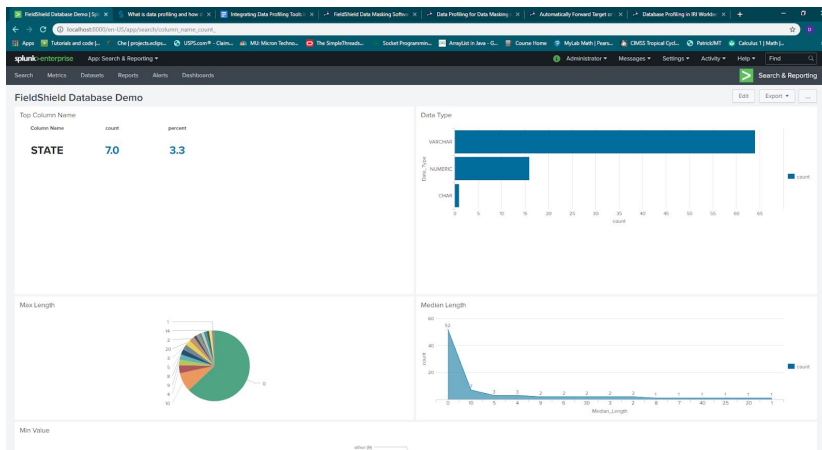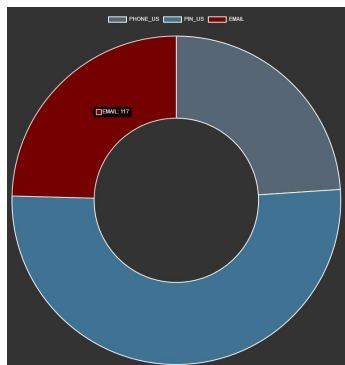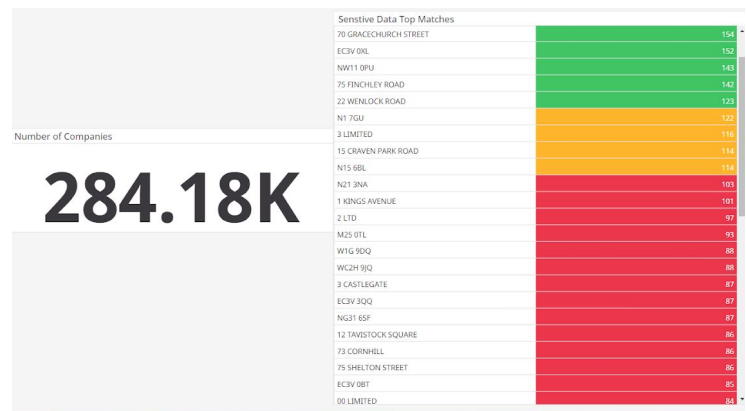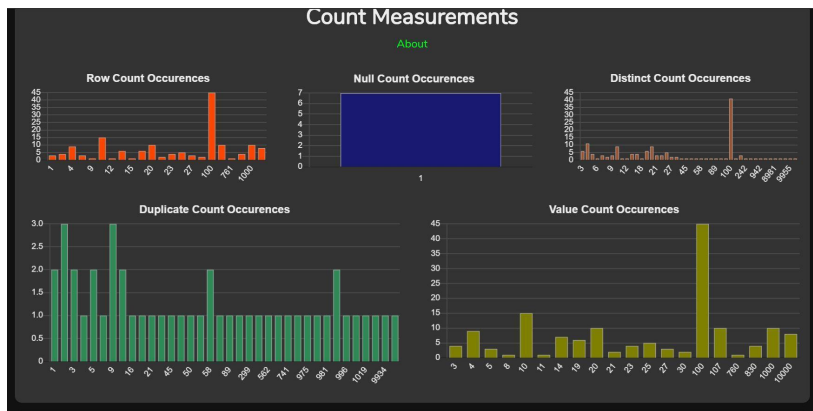
Multiple Masking Job Design Options

IRI FieldShield and other Voracity data masking, cleansing, transformation, migration, reporting, and wrangling jobs can be created and run *inside or outside* of IRI Workbench.

Job design methods supported *inside*:

1) **Job creation wizards**

2) **Color-coded syntax-aware job script editor with outline**

3) **Form Editors**

4) **Graphical parameters Dialogs**

5) **Mapping Diagrams**

Job design methods supported *outside*:

6) **DataSwitch No-Code Web App**

7) **erwin Mapping Manager**

8) **Value Labs Test Data Hub**

9) **Any external text editor**

10) **3GL app (system or API calls)**

IRI Voracity
An Insatiable Appetite for Data

Static Data Masking Workflows

SOURCES
LAN, Cloud
Static/Stream
HDFS/URL/APIs

TARGETS
LAN, Cloud
Static/Stream
HDFS/URL/APIs

Sources (left column)

- **FieldShield** — Relational DBs
- **FieldShield** — Flat Files
- **FieldShield** — Mongo DB
- **DarkShield** — Semi-/Unstructured
- **CellShield** — Spreadsheets

Workflow blocks

- Required Drivers JDBC & ODBC
- Database Profile Wizard
- Flat-File Profile Wizard
- FS Connection options:
  * IRI BSON Driver
  * Progress ODBC Driver
  * Mongo import/export
- NoSQL Cluster Search & Mask Wizard
- RDB Schema Search & Mask Wizard
- Dark Data File Search / Mask Wizard

JDBC Only

- **RowGen** — DB/File Test Data *Creation* Wizards
- Relation-free Data Masking Job Wizard
- Schema Pattern Search Wizard
- Schema Data Class Search Wizard
- NER Model Wizard

- DB Subseting & *Masking* Wizard
- Multi-Table *Masking* Wizard
- Data Class *Masking* Wizard

DATA CLASSIFICATION
- Preferences > IRI > *Data Classes & Groups*
- New Data Classification Setup Wizard

- Run As / Config *Masking* Task
- Excel-Side *Masking* Add-in

Targets (right column)

- Safe/Test Tables
- Search Results Job/Lineage Logs Re-ID Risk Scores
- Safe/Test Files
- *Re-ID Risk Score* Wizard
- *Anonymize Quasi-IDs*
- Safe/Test Collections
- Safe/Test Files, Docs, & Images
- Audit Log, Graph + SIEM Displays & Responses
- Safe/Test Sheets

LEGEND:
- → default or required
- ↔ interaction
- ····▶ optional
- ⊩──o◁ required-to-multiple options
- ◇──▶ conditional

And Multiple Job Deployment Options

1) **4GL scripts on the command line or in batch**

2) **From 3rd party automation tools like Stonebranch UAC, cron, etc.**

3) **Directly from KNIME in Eclipse, or a Splunk add-on app, *as* you report or index**

4) **Some jobs run without code changes in Hadoop via MR2, Spark, Spark Stream, Storm or Tez**

5) **Use graphical run configuration dialogs or the built-in task scheduler to launch local, remote, or HDFS jobs from IRI Workbench**

6) **System or API calls from 3GL programs or web services**

7) **Value Labs Test Data Hub, Cigniti Blueswan TDM, GitLab, Azure DevOps, Amazon CodePipeline, and Jenkins CI/CD**

8) **Actifio, Commvault & Windocks cloning tools for virtualized DB images / containers**

9) **DataSwitch no-code data engineering app**

Map once, deploy anywhere

Static Data Masking Functions (1-3 of 15)

Character Scrambling

- For ASCII data
- Less secure
- Reversible

Encoding / Decoding

- Converts binary to ASCII
- Supports base64 & hex
- Reversible

Encryption / Decryption

- 3DES EBC & SSL
- AES-128 & -256 CBC
- AES-256 Format-Preserving
- GPG (PGP-compatible)
- FIPS-compliant OpenSSL
- Custom

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Static Data Masking Functions (4-6 of 15)

Pseudonymization

Redaction / Obfuscation

Randomization

- Provides realistic names
- Reversible lookup values
- Non-reversible selection

- Partial/full-field masking
- Conditional omission
- Non-reversible

- Random data generation
- Random data selection
- Non-reversible

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Static Data Masking Functions (7-15 of 15)

Hashing

Expression Logic

String Manipulations
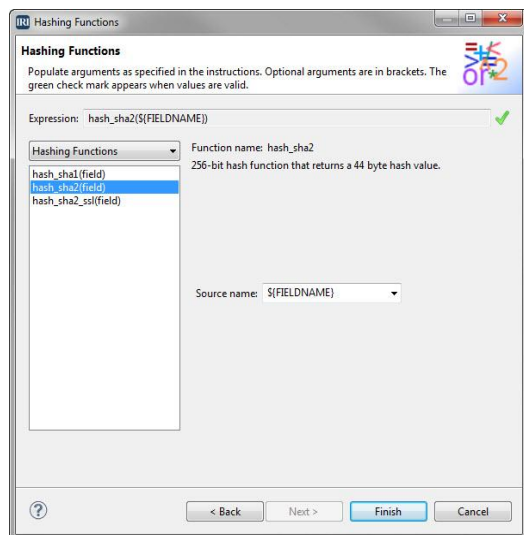
- SHA-1 & 2 cryptographic
- Returns hash of fieldstring
- Use for integrity checking

- Mathematical operations
- PCRE logic
- Custom blurring

- Find, replace, and add
- Reposition and trim
- Use INSTR information

Blurring & Bucketing

Add random "noise" (perturbate) to ages/dates, **and** generalize (anonymize) quasi-identifiers

Tokenization

DB-value substitute for PCI DSS

Deletion & Suppression

Erasure for GDPR Right to Be Forgotten

Custom Functions

User's field-level call

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Re-ID Risk Determination

US HIPAA and FERPA regulations require that patient and student data sets used in research or marketing have a statistically certified "very small" chance of being re-identifiable.
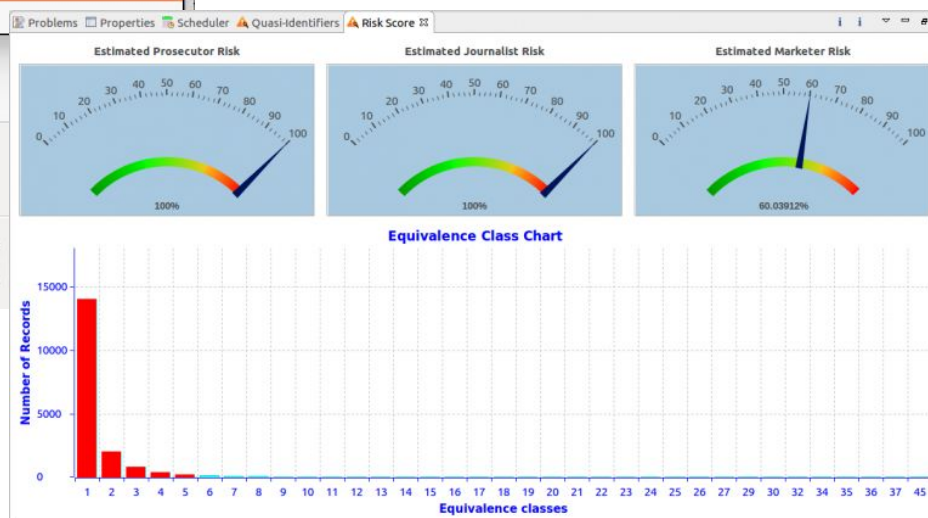
- IRI risk scoring wizard produces re-ID probability scores in 3 modes
- Analyzes quasi-identifiers with multiple, peer-reviewed functions
- Detail and graphed scoring reports

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Query-Ready XML Audit Log

MongoDB Masked

unmasked

- **1st Method: FieldShield w/CSV export & import**
- **2nd Method: FieldShield w/Progress O/JDBC drivers**
- **3rd Method: FieldShield w/BSON driver**
- **4th Method: DarkShield GUI, limited to Eclipse memory**
- **5th Method: DarkShield API, fastest & most flexible in volume**

Masking et al in Hadoop, too

Map once, deploy anywhere

Dynamic Data Masking Options

Method	Operation
ODBC Select / Update	Apply FieldShield column masks to target (view) tables for specific users/rows
DB App Invocation	Use .NET or Java SDK library functions or system-call job scripts on the fly
In-Situ Redaction	User and SQL-specific full and partial column masking on query
Custom I/O Procedures	Drive real-time application data directly to/from FieldShield jobs in memory
Real-Time Processing	Hadoop Spark and Storm processing of dynamic input streams (via Voracity VGrid)
Proxy-based	New "JDBC SQL Trail" driver to intercept application queries with minimal impact
Governance Mode	New runtime facility tied to RBAC/IAM infrastructure masks fields for some users

Encryption Key Management Options

1. Passphrase (key string) embedded in script, in clear or encrypted text
2. Passphrase string as environment variable
3. Passphrase string in (securable) key file
4. MFA, HSM/VM etc. via Azure Key Vault
5. Townsend Security Alliance Key Manager

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PII Encryption through Azure Key Vault

Azure Key Vault

FieldShield Job Script or
DarkShield API Calling Program

Obtain Encryption Passphrase

Masking Rule/Context

AES-256 FPE

Search Matcher/Context

Name, SSN, Email, etc.

Original
Data

Encrypted
Data

IRI FieldShield
PII / PHI Classification & Masking

IRI DarkShield
Unstructured Data Search & Security
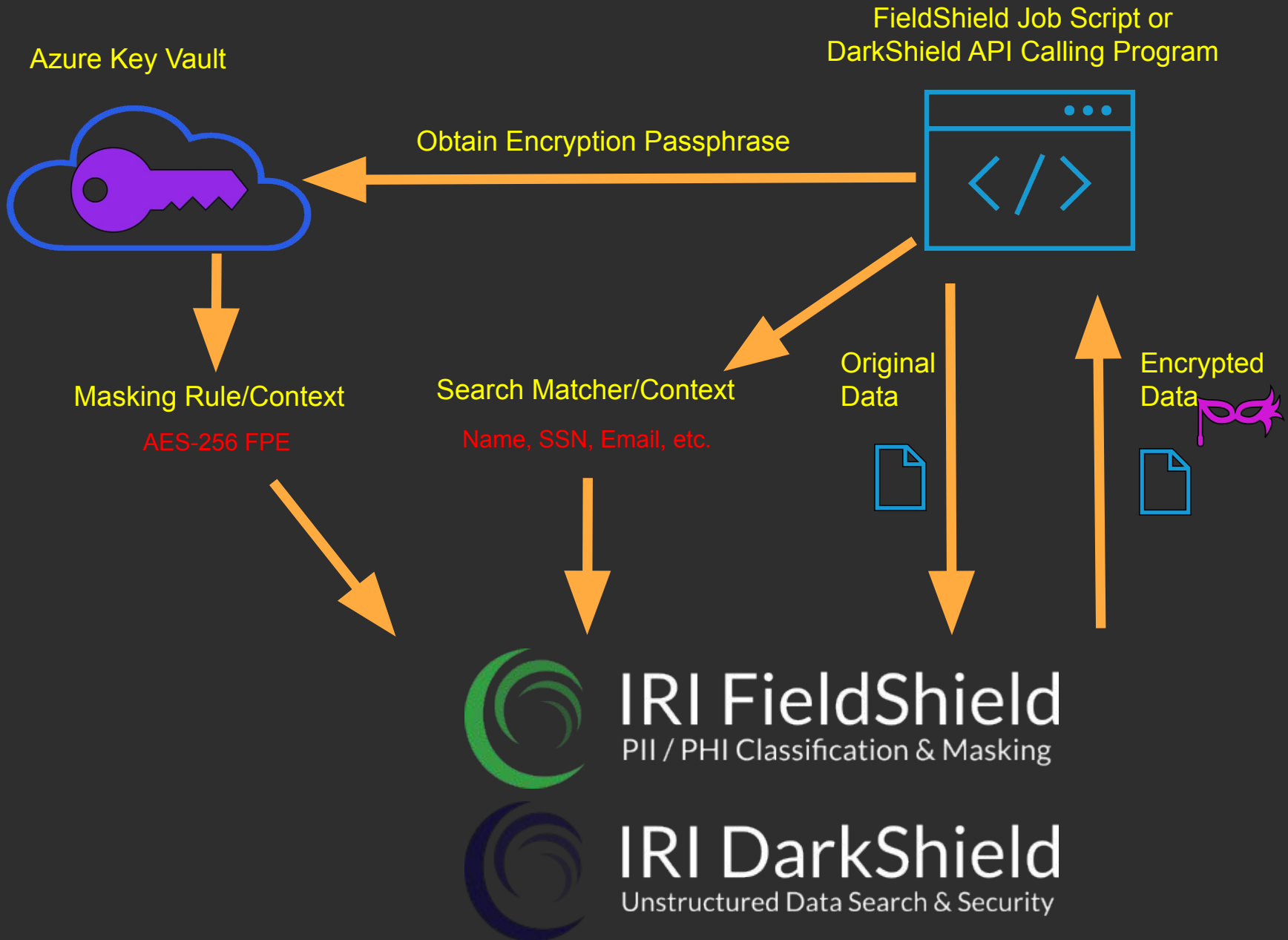
User Profiles

- Vertical industries and governmental agencies storing, processing, or outsourcing applications with sensitive data, such as:

  - Banks
  - Census / Tax
  - Defense

  - Health Care
  - Insurance
  - Schools

- Application, DB, and DW users handling sensitive data
- CISOs, compliance teams, consultants, IT managers, and solution architects

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Use Cases

Tesco Bank/RBS UK

- ○ Decrypt and re-encrypt fields in credit card migration and test files

- ○ Generate and manage encryption and user ID keys

- ○ Other projects protect 38,265 records per minute on Windows

Accenture Singapore

- ○ Design and run encryption and masking jobs on Linux servers

- ○ Secure PHI for the Ministry of Health Holdings (MOHH)'s Oracle DB

- ○ Row sequencing and job audits

Medicx Media Solutions USA

- ○ Encryption and hashing functions to PII and PHI in geo-medical
    consumer health databases

- ○ Exceeds HIPAA requirements in provisioning mScores™ data
    to digital and direct marketers

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Key Differentiators

Developer Support

- Version controls
- Master data definition
- Secure key management
- Git project management (teaming)
- SDK supports .NET and Java calls
- Data profiling and metadata discovery
- XML (and soon JSON) job logs, IAM

One-Stop-Shop

- Integrated data classification & search
- Includes re-ID risk scoring for HIPAA
- Use w/Voracity ETL, migrate, cleanse
- Metadata-compatible with RowGen TDM
- Used in DB subsetting wizard
- Also works in Voracity BI & KNIME jobs
- Runs w/Actifio DB clones, Splunk ES, etc.

Price Performance

- The data-centric security tool with:
  - ➜ The most sources
  - ➜ The most protection functions
  - ➜ The most target file formats
- Fastest standalone protection software

Ease-of-Use

- Familiar Eclipse GUI
- Self-documenting 4GL syntax
- Easy management and modification of jobs/metadata

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Competitive Advantages

vs. Oracle ([click](#))

vs. IBM

- ○ FieldShield scripts simpler than Optim interoperability model and Javascript options
- ○ Seamless integration with more sources
- ○ More functions
- ○ Lower cost

vs. Informatica

- ○ FieldShield DDM inclusive with product (compared to Informatica's upgrade)
- ○ More SDM protection functions
- ○ Integration with Eclipse and Excel
- ○ Access to 4GL scripts
- ○ Lower cost

vs. CA (Grid Tools)

- ○ Built-in CoSort engine makes FieldShield faster than GT Fast Data Masking
- ○ Tight integration with data profiling, ETL, data quality, and BI operations
- ○ Multi-target/format options
- ○ Lower cost
- ○ Built-in re-ID risk determination wizard

vs. Imperva (Camouflage)

- ○ FieldShield has more masking and encryption functions
- ○ Hash, decode, and pseudonymize functions
- ○ Faster and more extensible in the IRI Workbench IDE
- ○ Lower cost

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IRI CellShield
PII / PHI Search & Mask in Excel

IRI Data Protector Suite

What CellShield EE Does

Note: FieldShield & DarkShield Support Excel, too!
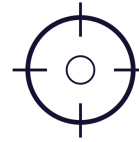
Search   Mask   Extract
                              Report

- Discovers, reports, and masks PII and perform audit actions in Excel 2010 & later

- Searches and secures PII in spreadsheets on one PC or throughout an SMB LAN

- Provides common and allow new search pattern definitions for PII formats

- Searches for strings in a dictionary, and find/fix PII *floating* in cells

- Supports reuse and sharing of patterns in project or cloud repositories

- Generates a report of all patterns found and open it for action in a worksheet

- Opens applicable worksheets and highlights the located ranges for protection

- Encrypts, redacts, or pseudonymizes in one-pass with chosen functions and options

- Reveals data with the decryption key, or if reversible pseudonymization was used

- Overlays results directly into the affected cells, or in another worksheet

- Moves between, or bulk-remediates all, identified worksheets and ranges

- Auto-inserts protection details into an un-editable audit column in the report

- Logging capability is configurable through the user interface, and allows for audit reports, error messages, and selected ranges to be sent to any of the following logging sources: audit column, email, Datadog, Splunk, file system.

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CellShield PII Discovery

The dark data profiling wizard in the IRI Workbench searches network-wide for sensitive data in spreadsheets based on user-specified (plus popular and saved) Java regular expressions (patterns):

Top Data Matchers Found by Count
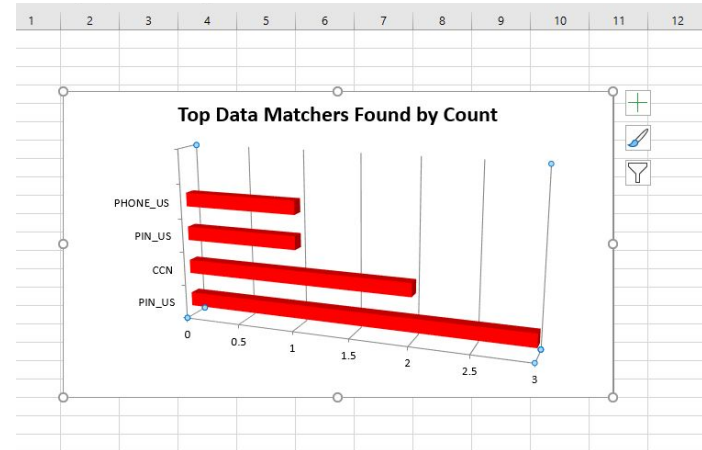
New Dark Data Search/Masking Job

Data Sources

Specify the input data sources.

Source URI
file:/C:/Users/dakoz/Downloads/cellshieldtest-20200706T17062...
file:/C:/Users/dakoz/Downloads/cellshieldpractice (fileTypes: [Ex...
file:/C:/Users/dakoz/Downloads (fileTypes: [Excel 2003 (.xls), Exc...

Add...
Edit...
Remove...
Up

Search Matcher

Search Matcher

Match Data Classes or Groups to a Data Rule.

Name: Email

Description: email

Data Class Name:	EMAIL	Details:	Data Class	Browse... Create...
Rule Name:	DataEncryptionRule	Details:	EXPRESSION = enc_aes256(${FIELDNAME})	Browse... Create...

Filters:

Details	Type	

Add...
Edit...

Data Class Selection

Data Class Selection

Select a Data Class or Data Class Group.

Data Class: NAMES

Details	Type
FIRST_NAME	Data Class
FULL_NAME	Data Class
LAST_NAME	Data Class

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CellShield Search Report & Action Sheet

The report produced by the profiling wizard opens in a dynamic worksheet supported by an action dialog for protection and auditing activities:

CellShield Masking Functions

Perform point-and-click encryption and decryption, redaction (full or partial cell), or pseudonymization (reversible and non-reversible) of applicable ranges within the spreadsheets in the report. Formulas may also be encrypted and decrypted.
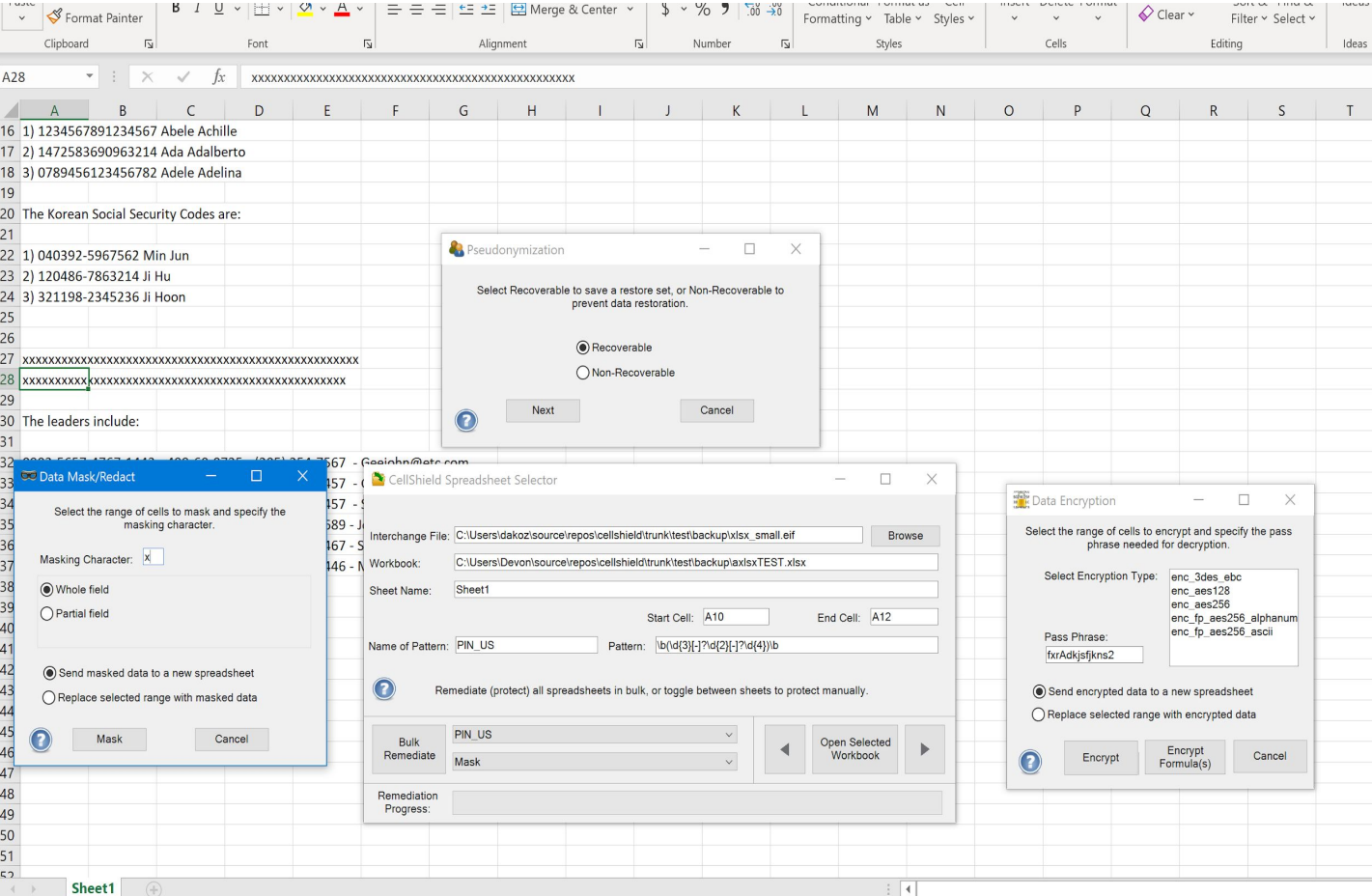
Intra-Cell Searching & Masking, Too

- Feature finds and protects floating PII, *ad hoc*, or *en masse*
- Available protections include encryption, masking, and pseudonymization
- Encryption and pseudonymization are reversible through the decryption and recover options, respectively

CellShield Audit Log Options

An uneditable log entry for the function applied to each pattern identified in the report is automatically added onto each action. Based on logging settings, this information may also be sent to a file, to Splunk, to Datadog, or to an email address.

CellShield EE Roadmap
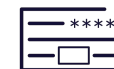
Search   Extract   Mask   Report

New in Version 2 (Released Q3'20)	What's Planned for Version 3 (2022)
Faster multi-sheet, and full-sheet masking	Support for other hardware platforms
Improved audit logging, with a configurable logging framework that allows for feeds to Splunk, Datadog, Email, and files. Selected ranges and error messages may also be logged.	Integration with Azure key vault for managing encryption keys
New intracellular functions, including encryption, decryption, pseudonymization and restoration	Integration with Active Directory for IAM
Searching and masking of UTF-8 data types	FPE for multi-byte characters
New Autoprotect form for simple bulk remediation	Additional masking functions (e.g., blurring)
Encryption/decryption of formulas	Automated masking through macros
Charts to display search results graphically	Support for sheets in Azure (like DarkShield)

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IRI DarkShield
Unstructured Data Search & Security

IRI Data Protector Suite

What DarkShield Does
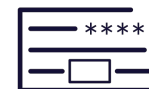
Search Extract Redact Audit

- Simultaneously scans, extracts, and de-IDs or deletes PII (and audits actions) in all supported file formats

- Handles PII floating in semi/unstructured text, MS/PDF documents, BLOB columns, and NoSQL collections

- Finds faces or defined data classes tied to RegEx patterns, lookup sets, NER models,and/or image regions

- Builds, saves, and re-uses semi-supervised, machine learning models in project or cloud repositories

- Blacks-out PII in images, blurs faces, and applies of encryption (including FPE), pseudonymization, hashing, encoding, bit scrambling, redaction, or erasure functions for PII in text files and documents

- Writes masked files atop originals, or to different folders with the same file names and formats

- Shows search, remediation, and model training job status via real-time progress bars

- Shares search methods and masking functions with IRI FieldShield and IRI CellShield EE

- Generates logs of all values found or masked, along with IRI-compatible metadata for BI, queries, etc.

- Creates graphical, interactive displays of search and mask results, or hand-offs log files to Splunk

- Runs in IRI Workbench with other IRI and Eclipse tools, from the command line, or via REST API

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Granular Sourcing/Targeting

Search   Extract   Redact
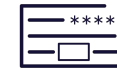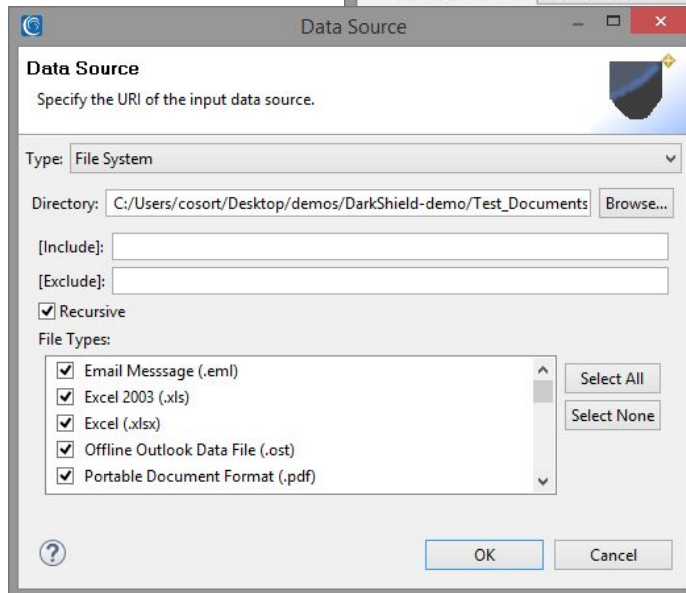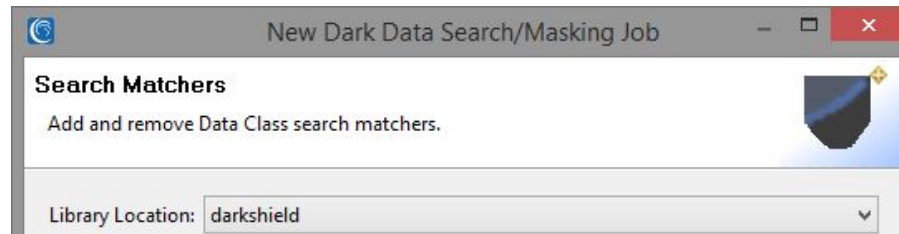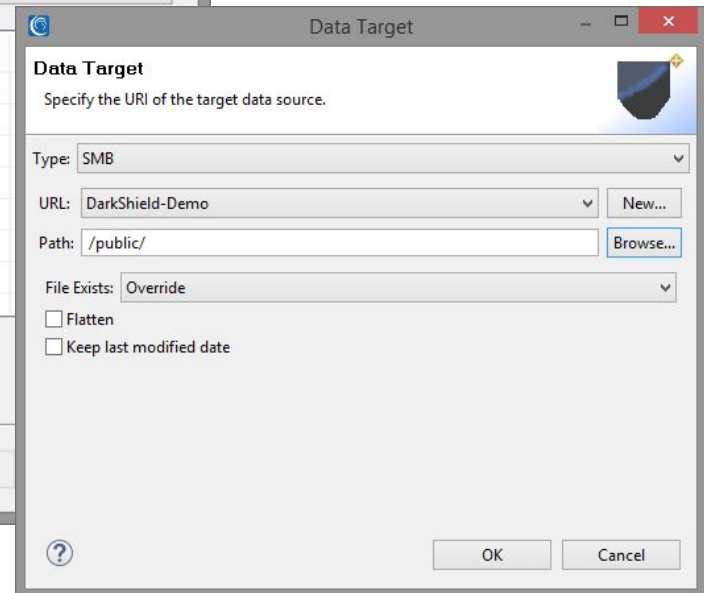
Use the DarkShield dark data discovery wizard to find sensitive data in unstructured data LAN-wide (or in S3), mask it, and re-target the results.

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Extract

Optionally and automatically extract all of the values you searched for (think GDPR data portability or CCPA DSARs), plus the metadata associated with the files containing those values.

Redact

Apply width-preserving redaction, blackout, deletion, encryption, pseudonymization, and other data masking functions to protect PII and comply with data privacy laws like the GDPR.

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Image File Redaction or Value Replacement …

Search **Extract** **Redact** **Audit**

… or Test Value (RowGen) Synthesis into Images or Documents …

BMP, DICOM GIF, JPx, PNG, and TIFF, alone or in docs like PDFs and Word!

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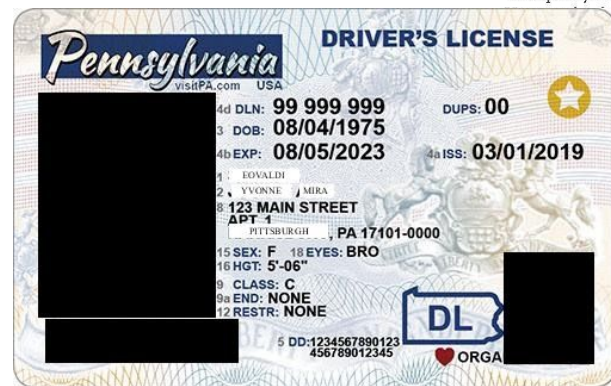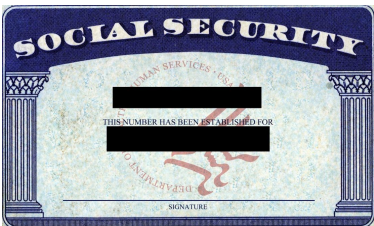
DICOM Medical Image De-ID / Anonymization

Search　　Extract　　Redact　　Audit

Before DarkShield:
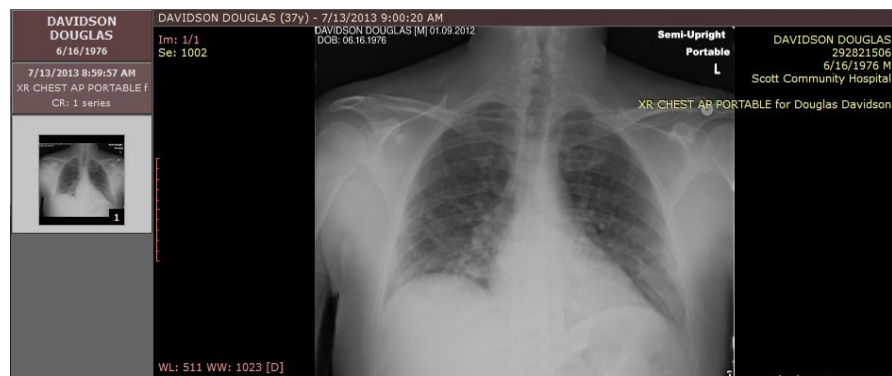
	E	F	G	St
1	Subject ID	Study UID	Study Description	
2	292821506	2.25.106461954783291641048254423668895644619	XR CHEST AP PORTABLE for Douglas Davidson	
3	292821506	2.25.106461954783291641048254423668895644619	XR CHEST AP PORTABLE for Douglas Davidson	
4	339833062	2.25.54162941669186302917503646640219638	NA	

After DarkShield:

	C	D	E	F	G	H
1	3rd Party Analysis	Data Description URI	Subject ID	Study UID	Study Description	Study Date
2	NO	httpsdoi.org10.7937s17z-r072	703523712	2.25.106461990375634587137034423668956446198	XR CHEST AP PORTABLE for Axodquq Wmhpzjcx	7/13/201
3	NO	httpsdoi.org10.7937s17z-r072	703523712	2.25.106461990375634587137034423668956446198	XR CHEST AP PORTABLE for Axodquq Wmhpzjcx	7/13/201
4	NO	httpsdoi.org10.7937s17z-r072	204498801	2.25.54162941669186302917503646640219638	NA	7/5/200

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Deletion Function

Search   Extract   Redact   Audit
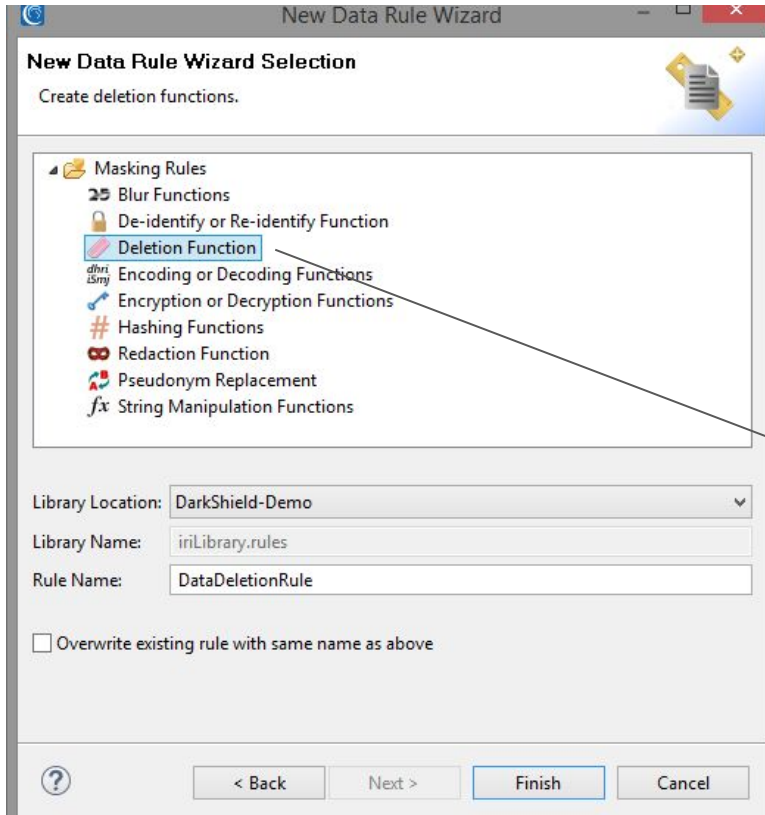
IRI FieldShield, DarkShield & CellShield and other features in Voracity combine to comply with GDPR (and thus CCPA, KVKK, etc.) provisions like:

- Discovery and **De-Identification** of PII and PI

- The right to be **Forgotten** (via erasure like this)

- Data **Portability** (via extraction and reformatting)
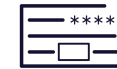
- Data **Rectification** (via discovery and cleansing)

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Search & Mask via Column & Path Filters

Search   Extract   Redact   Audit

Allows the user to take the column, segment, or key-value pair structure of an Excel sheet, CSV, HL7, X12, JSON or XML file -- or JDBC-connected DB column names -- into account in searches to:

- Ignore fields that do not match the filter

- Increase search speed, and narrow the scope of the search results

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Relational and NoSQL Database Supports

Search   **Extract**   **Redact**   **Audit**

Data classes and filters can also be used to find and mask the PII within unstructured text columns in relational tables via JDBC drivers, or in CosmosDB, DynamoDB, Google BigTable, MongoDB, Cassandra, Elasticsearch, Redis, Solr, and Couchbase collections/clusters.

Combine table filters with XML or JSON path filters to pinpoint and mask PII in unstructured XML or JSON text within RDB columns.

DarkShield can also automatically detect, search and mask binary data (images and MS/PDF documents) embedded within BLOB columns of JDBC-connected RDBs.
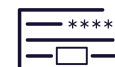

Total Data Management

NER & NLP with Machine Learning
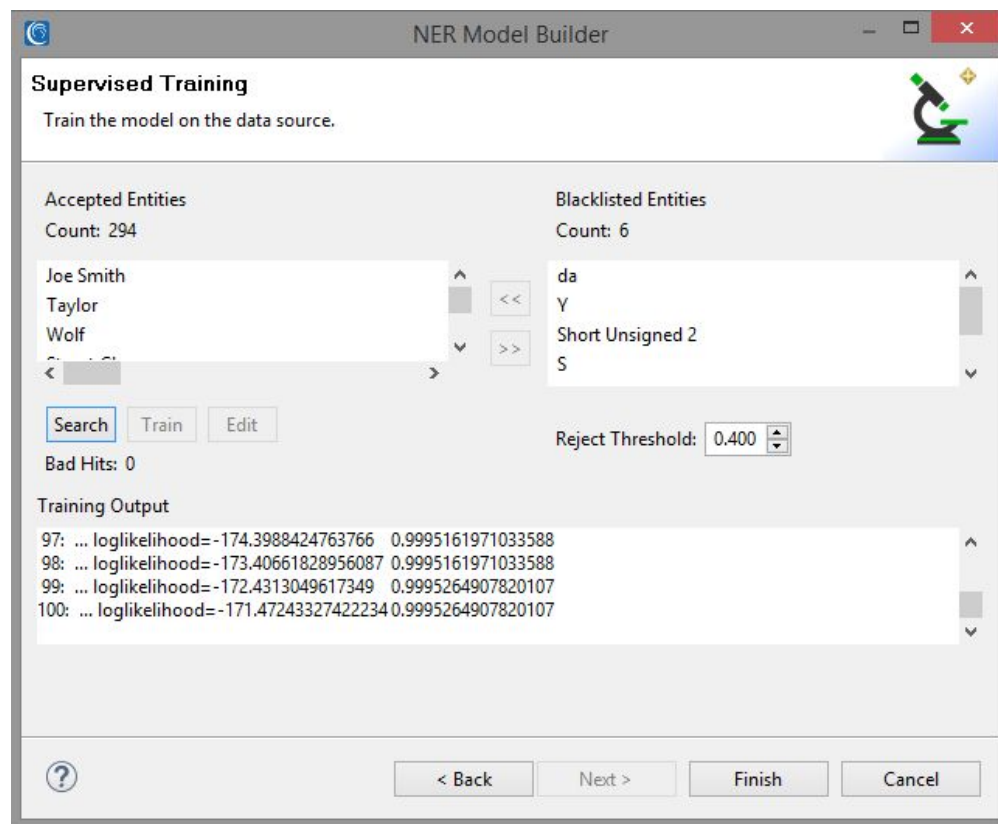
Search   Extract   Redact   Audit

DarkShield supports both pre-trained OpenNLP Name Finder models or new Named Entity Recognition (NER) models that you can build and train inside its semi-supervised machine learning dialog.

This iterative process improves the accuracy of searches for names and other nouns based on their Natural Language Processing (NLP) context in sentences.

The DarkShield API now also supports Tensorflow and PyTorch NER models.

Compare this search method to other DarkShield search methods, like pattern and lookup matches, path filters, or bounding-box areas (for images).

NER Model Builder

Supervised Training
Train the model on the data source.

Accepted Entities
Count: 294

Joe Smith
Taylor
Wolf

Blacklisted Entities
Count: 6

da
Y
Short Unsigned 2
S

Search   Train   Edit

Bad Hits: 0

Reject Threshold: 0.400

Training Output

97: ... loglikelihood=-174.3988424763766   0.9995161971033588
98: ... loglikelihood=-173.40661828956087 0.9995161971033588
99: ... loglikelihood=-172.4313049617349   0.9995264907820107
100: ... loglikelihood=-171.47243327422234 0.9995264907820107

< Back   Next >   Finish   Cancel
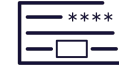
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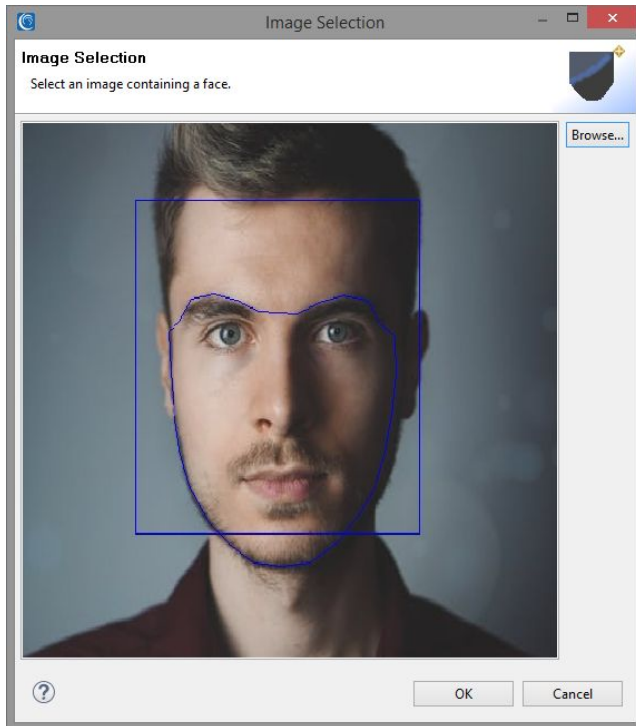# Facial Detection & Trained Facial Recognition Masking

Search Extract Redact Audit

DarkShield can *detect* faces in any image and blur (all of) them, or just those it *recognizes* from your trained library of faces.

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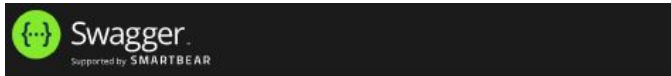
Documented RPC APIs

Search   Extract   Redact   Audit

Masking of Cloud Files

Search   Extract   Redact   Audit

masked-bucket

OBJECTS   CONFIGURATION   PERMISSIONS   RETENTION   LIFECYCLE

Buckets > masked-bucket

UPLOAD FILES   UPLOAD FOLDER   CREATE FOLDER   MANAGE HOLDS   DOWNLOAD   DELETE

Google

Cloud Storage

masked-container
Container

Search (Ctrl+/)   «

⬆ Upload   🔒 Change access level   ↻ Refresh   🗑 Delete   ⇄ Change tie

□ Overview

🔧 Diagnose and solve problems

Microsoft Azure
Blob Storage

Authentication method: Access key (Switch to Azure AD User Account)
Location: masked-container

Search blobs by prefix (case-sensitive)   ⬤ Show deleted blobs

×

masked/

Copy S3 URI

Objects   Properties

amazon
S3

Objects (3)

Objects are the fundamental entities stored in Amazon S3. You can use **Amazon S3 inventory** [↗] to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. **Learn more** [↗]

↻   📋 Copy S3 URI   📋 Copy URL   ⬇ Download   Open [↗]   Delete   Actions ▼   Create folder   📤 Upload

🔍 Find objects by prefix   < 1 >   ⚙

	Name ▲	Type ▽	Last modified	▽	Size ▽	Storage class ▽
☐	📄 example.csv	csv	September 23, 2021, 11:33:42 (UTC-04:00)		297.0 B	Standard
☐	📄 test.json	json	September 23, 2021, 11:33:43 (UTC-04:00)		541.0 B	Standard
☐	📄 test.xml	xml	September 23, 2021, 11:33:44 (UTC-04:00)		646.0 B	Standard

Audit

Easily query, analyze, and format the results of search and mask operation through built-in reports and this graphical display.
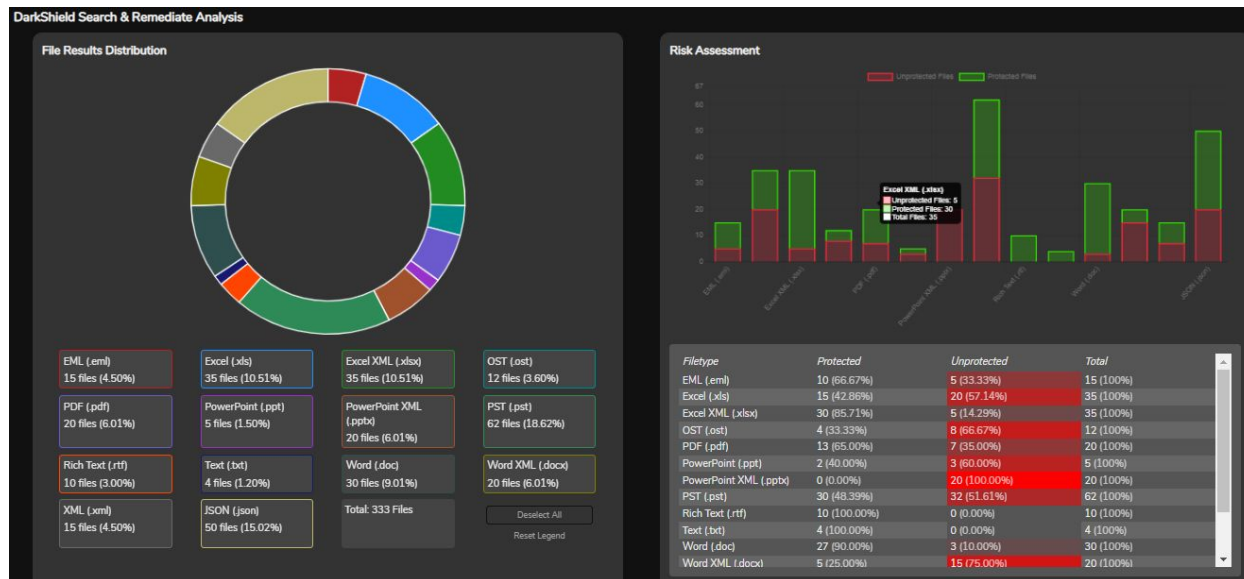
Or, export DarkShield log data for visualizations in BI tools like DataDog, or to SIEM environments like Splunk ES, shown here.

It is also then possible to take actions through the Splunk Adaptive Response Framework or a Splunk Phantom playbook.

DarkShield **Benefits**

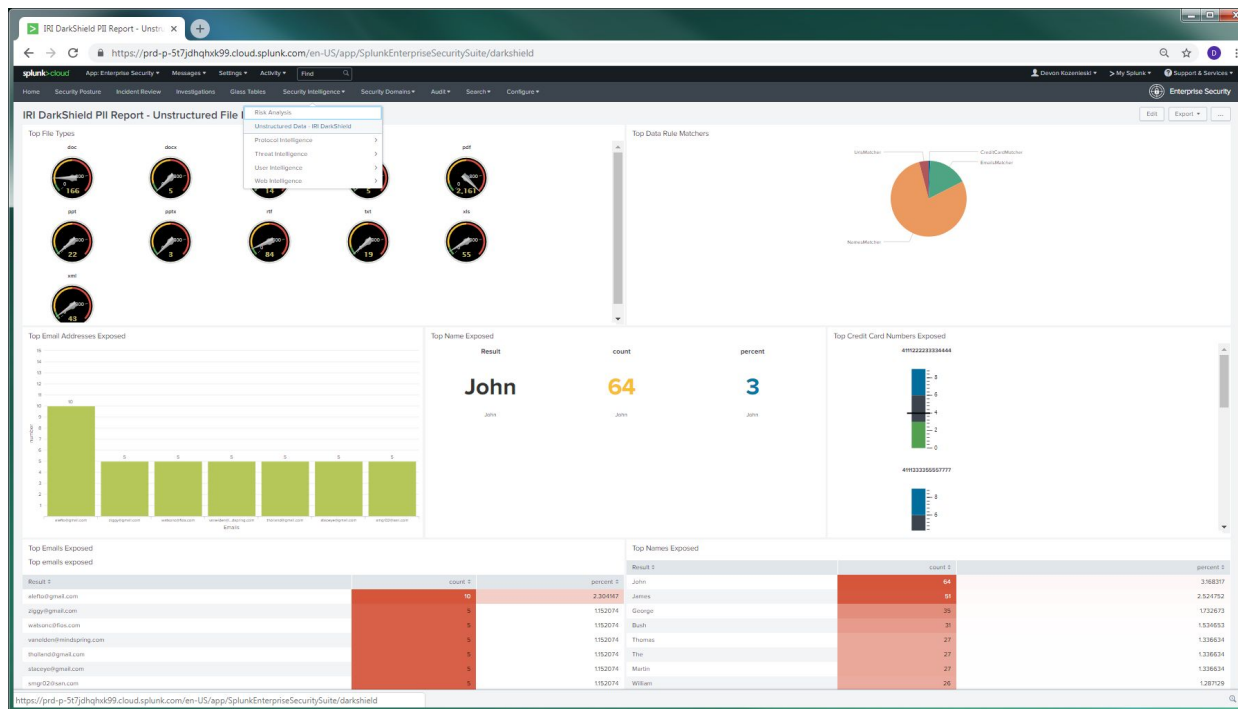1. Combines PII discovery, delivery, deletion, and reporting in multiple unstructured source formats into one or more ergonomic operations
2. Allows pattern reuse and stacked search methods for easier and more accurate results
3. Consolidates multiple *right to be forgotten* and *data portability* requests into the same find/fix operation through literal names or lookup-file matches
4. Supports multiple drives, nodes, and threads for searching and masking work
5. Can operates in the same Eclipse job design and metadata environment, IRI Workbench, with related data governance and management activities or via OpenAPI
6. Features affordable licensing options (standalone, bundled, or free in Voracity)
7. Compatibility with IRI FieldShield and CellShield data masking functions
8. Parameter serialization and modeling for easy job modification and batch execution
9. Integration with IRI RowGen to synthesize and insert test data into images, docs, etc.

Development **Roadmap**

1. More unstructured format support, including A/V and proprietary/packaged apps
2. Additional ergonomic convergence with structured and embedded data sources
3. Plug-in integration with more SIEM tools *beyond* Datadog, Splunk ES, and Phantom Playbooks which are now supported, like IBM QRadar and SolarWinds
4. Retrofitting new API features into IRI Workbench wizards

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IRI DMaaS
Data Masking as a Service
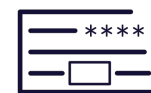
IRI Data Protector Suite

What is DMaaS?
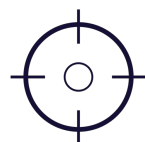
Search Extract Mask Report

- IRI Data Masking as a Service (DMaaS) is a professional service engagement
- DMaaS makes use of the proven IRI 'shield' software products described above
- Certified IRI experts classify, discover, and de-identify PII of concern in supported silos
- Also available: HIPAA re-ID risk scoring and anonymization, and 'fake PII' for testing
- IRI services are performed under a SoW with NDA, BAA, or other data security terms
- Source data that cannot be sent is accessed via VPN or secure public/private cloud
- Data is only accessed by IRI engineers in the US or certified partners like Capgemini
- All data access, classification, discovery (search) and masking operations are logged
- Billing is hourly or daily, with project rates available; IRI software costs are subsumed
- Customer is responsible for payment of cloud infrastructure of their choice

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User Profiles

- DBAs and sysadmins responsible for PAN, PHI, PII or other sensitive information

- Sites needing standard data classification and consistent masking functions

- CISOs without sufficient internal IT resources to do this work internally

- Data governance and C-suite officers subject to compliance audits

Use Cases

RBS / Tesco (PCI DSS)

- Produced and implemented custom encryption for testing data in M&A

Confidential (HIPAA)

- Cataloged and de-identified protected health information

University of Adelaide (Privacy Act)

- Data classification, search, and de-identification of PII in massive PeopleSoft financial, HR, and campus test data schemas in Oracle

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IRI RowGen
Smart Test Data Generation

*Also available with IRI Data Protector or
Manager Suites, and the IRI Voracity Platform*

What RowGen Does

- Creates synthetic but realistic random and random-real test data simultaneously

- Improves DB prototypes, application quality, benchmarking, and outsourced operations

- Uses standard DB DDL, production file, and custom metadata to define layouts

- Preserves structural and referential integrity of real EDW DBs for testing

- Produces data in any type, structure, volume, value range, and if condition

- Synthesizes composite data values and custom (master) data formats

- Generates computationally valid and invalid NID (Codice Fiscale, etc.) SSNs, CCNs

- Sets and graphs test data value distributions (linear, normal, random, etc.)

- Applies common attribute rules (like lookups) rules for pattern-matched field names

- Filters, transforms, and pre-sorts test data while it's being generated

- Writes loader metadata and perform direct path loads for test DB populations

- Builds test flat-file and custom/structured detail and summary report targets

- Subsets and masks databases automatically for test purposes

- Provides SDK functions for generating test data in Java apps and Hadoop

- Works with RDB, IRI, and third-party metadata, plus many CI/CD, cloning and TDM tools

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Synthesize Only w/ DB Data Models or File Metadata

Build Test Data for:

- RDBs
- ASN.1
- CLF/ELF
- COBOL
- CSV / TSV
- FHIR
- Images
- HL7
- Excel
- Hadoop
- JSON
- LDIF
- NoSQL DBs
- PDF Forms
- X12
- XML

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DB Subsetting, Masking Optional

Included table subsetting and test data generation wizards facilitate DB and EDW prototyping, as well as test data virtualization for DevOps. Masked and referentially-correct copies of production table extracts ensure that production data is safe and test data is realistic. Run these batch jobs from IRI Workbench or Value Labs TDH, the command line, or Windocks.

User Profiles

Anyone doing DB testing, app development, stress-testing, or benchmarking, including:

- ○ Developers (programmers)
- ○ DBAs and DW (ETL) architects
- ○ Analysts and consultants

Use Cases

Bank of Montreal

- ○ Generates safe, realistic 20GB Oracles tables with RI for query testing

MasterCard Peru

- ○ Synthesizes PAN and PII in files to support OLTP and app testing

Transitive UK

- ○ Simultaneously creates and transforms data to test cross-OS virtualization

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Key Differentiators

1. [Big data](#) generation and population performance for flat/EDI files, RDB and NoSQLDBs, Data Vault 2, HL7/X12, ASN.1 CDR files, XLS/X spreadsheets, and even images and documents (via DarkShield API)

2. Embedded CoSort pre-sorting engine speeds VLDB [loads](#)

3. Synthetic data that's broader and safer than real data via multiple methods: https://www.iri.com/blog/data-protection/making-realistic-test-data-production

4. *Concurrent* test data manipulation (transformation) and custom report outputs

5. Simple, portable, and modifiable test data generation and auto-built DB loader scripts, all managed visually in Eclipse, and easily integrated Into TDM pipelines and products (see next slide)

6. Metadata compatibility with IRI DDF, erwin SmartConnectors, and MIMB: to facilitate test data generation for 3rd-party BI, CRM, and ETL tools

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What's New in RowGen

Recently Added	Development Underway
Ability to generate Data Vault test data	Random direct DB column lookups
New email, CCN and NID generators	Target support for Parquet, et al
Output to Excel sheets and ASN.1 files	Provisioner for Splunk test data
Integration with Windocks and VL TDH	KNIME node test data integration
Work with DarkShield for test data in images	Work with DarkShield to populate test forms

IRI offers four methods for producing safe, intelligent test data in referentially correct database, flat-file, semi-structured file, and formatted report targets:

1. Production data masking/scrambling in IRI FieldShield or IRI Voracity
2. Database subsetting & masking in FieldShield or Voracity
3. Synthetic test data creation (via random generation/selection) in RowGen or Voracity
4. A combination of the above techniques in Voracity

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TDaaS & TDM Options

1. Test Data as a Service (TDaaS), a remotely provided professional engagement leveraging RowGen or any of the data masking and subsetting features described above to provide highly customized test data without licensing or learning new technology.

2. Run IRI CLI jobs in CI/CD pipelines like Jenkins, GitLab, Azure DevOps, AWS, etc.

3. Run IRI jobs with these DB virtualization tools, which call our scripts at cloning time:

   a. Actifio

   b. Commvault

   c. Windocks

4. On-demand TDM web apps are tightly integrated with IRI software too, including:

   a. Cigniti BlueSwan

   b. ValueLabs Test Data Hub (TDH)

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Learn and Share

IRI Data Masking Solutions

Data Masking How-to Articles

LinkedIn Data Masking Group

IRI Mask/Test Tech Talk Videos

IRI Test Data Solutions

Test Data How-to Articles

LinkedIn Test Data Group

Voracity Platform Resources

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