

# CAPSTONE PROJECT — FINAL REPORT

Virginia Market Square — Farmers Market E-Commerce Platform

CIS2987 Capstone · Arnold Marten · Spring 2026 · Instructor: Anup Parajuli

<b>9</b> Phases	<b>48</b> Tasks	<b>51.5</b> Total Hours	<b>100%</b> Complete	<b>42</b> Products
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<b>Course</b>	CIS2987 — Capstone
<b>Instructor</b>	Anup Parajuli
<b>Semester</b>	Spring 2026
<b>Developer</b>	Arnold Marten
<b>Start Date</b>	March 9, 2026
<b>End Date</b>	April 22, 2026 (4 days ahead of schedule)
<b>Repository</b>	github.com/amarten1112/Capstone
<b>Live Site</b>	http://http://arniemarten.online/
<b>PM Software</b>	GitHub Projects (github.com/users/amarten1112/projects/3)

## 1. Project Summary

Virginia Market Square is a full-stack, multi-vendor e-commerce web application designed for a farmers market in Virginia, Minnesota. The platform supports three distinct user roles — customers, vendors, and administrators — each with dedicated dashboards and role-specific functionality.

Customers can browse 42 products across 9 local vendors, filter by category, search by keyword, manage a shopping cart, and complete purchases through Stripe payment processing. Vendors manage their product listings, view order history, and track sales metrics through a dedicated portal. Administrators oversee the entire marketplace with tools for user management, vendor approval, event scheduling, and contact submission review.

The application was built from scratch over 9 phases using PHP 8.x with MySQLi prepared statements, a 12-table normalized database (3NF), Bootstrap 5.3 for responsive design, and vanilla JavaScript for client-side interactivity. Security was a priority throughout: bcrypt password hashing, CSRF token protection on all forms, XSS output escaping, and Stripe's PCI-compliant Payment Element ensure card data never touches the server.

**Tech Stack: PHP 8.x · MySQL/MariaDB · Bootstrap 5.3 · JavaScript ES6+ · Stripe API · GitHub Actions CI/CD · IONOS Hosting**

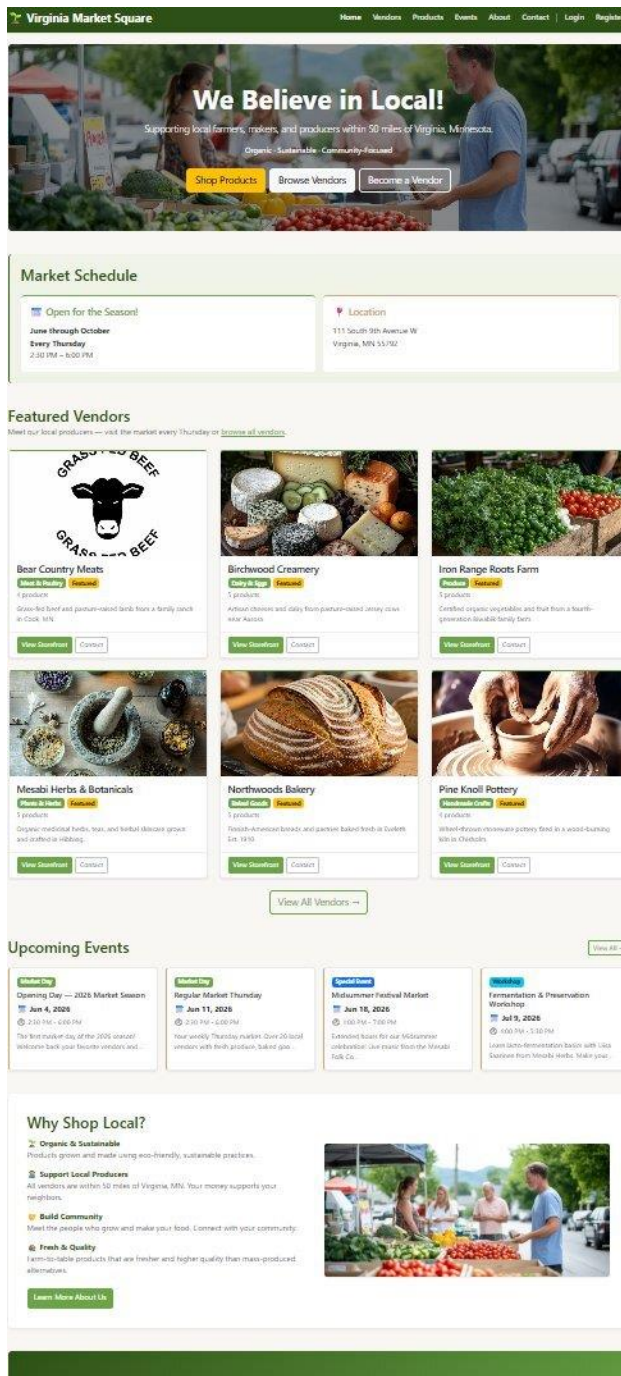
## 2. Project Timeline — All Tasks

Task	Description	Est	Act	Date	Status
<b>Phase 1: Planning, Design &amp; Database Architecture</b>					
1.1	Project charter with scope and requirements	0.5	0.5	Mar 10	Done
1.2	Sitemap with 3 user roles	0.5	0.5	Mar 10	Done
1.3	20+ page wireframes	1.5	2.0	Mar 11	Done
1.4	Visual mockups of key pages	1.0	1.0	Mar 12	Done
1.5	Complete ER diagram	1.0	1.0	Mar 12	Done
1.6	Database design doc with normalization	0.5	0.5	Mar 12	Done
<b>Phase 2: Advanced Database &amp; Environment Setup</b>					
2.1	Design normalized relational schema	1.0	1.0	Mar 19	Done
2.2	Write SQL schema & create all tables	1.5	1.5	Mar 19	Done
2.3	Set up development environment	2.0	2.5	Mar 19	Done
2.4	Populate test data & fixtures	1.5	1.5	Mar 19	Done
<b>Phase 3: User Authentication Systems</b>					
3.1	Admin authentication system	1.0	1.0	Mar 21	Done
3.2	Vendor authentication system	1.5	1.5	Mar 21	Done
3.3	Customer authentication system	1.5	1.5	Mar 21	Done
3.4	Authentication helper functions	1.0	1.0	Mar 21	Done
3.5	Session security & logout	0.5	0.5	Mar 21	Done
<b>Phase 4: Backend Pages &amp; API Logic</b>					
4.1	Product browsing pages (with JOINS)	2.0	2.0	Mar 22	Done
4.2	Category filtering & search	1.5	1.5	Mar 22	Done
4.3	Individual product detail page	1.0	1.0	Mar 23	Done
4.4	Vendor storefront pages	1.0	1.0	Mar 23	Done
4.5	Contact & event pages	0.5	0.5	Mar 23	Done
4.6	Add to cart	1.0	1.0	Mar 24	Done
4.7	View cart page (with JOINS)	1.0	1.0	Mar 24	Done
4.8	Update cart quantities, remove items	1.0	1.0	Mar 25	Done
4.9	Checkout flow (multi-step)	1.5	1.5	Mar 25	Done
4.10	Order creation & confirmation	1.0	1.0	Mar 26	Done
4.11	Order history & tracking	0.5	0.5	Mar 26	Done
4.12	Vendor dashboard (sales metrics)	1.0	1.0	Mar 27	Done
4.13	Vendor product management	1.0	1.0	Mar 27	Done
<b>Phase 5: E-Commerce Payment Integration (Stripe)</b>					
5.1	Stripe API setup and testing	1.0	1.5	Apr 4	Done
5.2	Payment processing page	1.0	1.0	Apr 4	Done
5.3	Payment error handling	1.0	0.5	Apr 4	Done

Phase 6: Frontend & Responsive Design					
6.1	CSS design system & Bootstrap overrides	1.0	1.5	Apr 7	Done
6.2	Homepage responsive design	0.5	0.5	Apr 8	Done
6.3	Product catalog & filtering UI	0.5	0.5	Apr 8	Done
6.4	Product detail page styling	0.5	0.5	Apr 8	Done
6.5	Shopping cart page styling	0.5	0.5	Apr 9	Done
6.6	Multi-step checkout UI	0.5	0.5	Apr 9	Done
6.7	Vendor & customer dashboard styling	1.5	1.0	Apr 10	Done
6.8	Forms styling (all forms)	0.5	0.5	Apr 11	Done
6.9	Navigation & layouts	0.5	1.0	Apr 7	Done
6.10	Mobile responsiveness testing	1.0	0.5	Apr 12	Done
6.11	Cross-browser testing	0.5	0.5	Apr 12	Done
Phase 7: JavaScript & Interactivity					
7.1	Form validation (client-side)	1.0	1.5	Apr 19	Done
7.2	Shopping cart interactivity (AJAX)	1.0	1.0	Apr 19	Done
7.3	Mobile menu & interactive elements	0.5	0.5	Apr 19	Done
7.4	Image handling & optimization	0.5	0.5	Apr 19	Done
Phase 8: Content, Images & Sample Data					
8.1	Sample content & consolidated seed data	1.0	1.0	Apr 21	Done
8.2	Image verification & production integration	1.0	0.5	Apr 21	Done
Phase 9: Testing, Optimization & Deployment					
9.1	Comprehensive testing & documentation	1.5	1.5	Apr 22	Done
9.2	Final deployment & verification	1.5	1.0	Apr 22	Done
<b>TOTAL — 48 tasks across 9 phases</b>		<b>48.5</b>	<b>51.5</b>	<b>ALL COMPLETE</b>	

### 3. Proof of Completed Tasks

Screenshots from the production site demonstrating all major features across all three user roles.



**Homepage** — Hero section, market schedule, featured vendors, upcoming events, and "Why Shop Local" section (Phases 1, 4, 6)

**Virginia Market Square**

[Home](#) [Vendors](#) [Products](#) [Events](#) [About](#) [Contact](#) | [Login](#) [Register](#)

## Products

Showing 1-12 of 42 products

All Categories
▼

Featured First
\$ Min
\$ Max

Filter

**Featured**  
Aged Sharp Cheddar  
By [Barkwood Creamery](#)  
Dairy & Eggs

Aged 6 months on the farm from our own Jersey milk. Rich, buttery depth you will...

**\$12.00** per 8 oz block

[View Details](#)

**Featured**  
Beeswax Pillar Candle  
By [Helen's Honey Bee Apiculture](#)  
Handmade Crafts

Pure beeswax pillar candle. 2 1/2 inches. Natural honey scent, cleaning burn. No...

**\$16.00** each

[View Details](#)

**Featured**  
Dorsetshire Pork Chops  
By [Zango Craft House](#)  
Meat & Poultry

Slow-to-cook our chops from our heritage Dorsetshire pigs. Parsnips and woodfired...

**\$14.00** per lb.

[View Details](#)

**Featured**  
Bud Vase Set — Pair  
By [Zango Craft House](#)  
Handmade Crafts

Matched pair of small wheel-thrown bud vases. Subtle glaze variation makes each...

**\$48.00** per set

[View Details](#)

**Featured**  
Cardamom Pulla Bread  
By [Barkwood Creamery](#)  
Baked Goods

Traditional Danish sweet bread braided with butter, cardamom, and pearl sugar...

**\$9.00** per loaf

[View Details](#)

**Featured**  
Elderberry Tincture  
By [Locally Herbs & Botanicals](#)  
Plants & Herbs

Concentrated elderberry and echinacea tincture in alcohol base. Cold sewage strap...

**\$22.00** per 2 oz bottle

[View Details](#)

**Featured**  
End-Grain Maple Cutting Board  
By [Zango Craft House](#)  
Handmade Crafts

10 1/2 inch end-grain maple board. Finished with food-safe walnut oil. Comes with...

**\$65.00** each

[View Details](#)

**Featured**  
Farm Fresh Eggs  
By [Barkwood Creamery](#)  
Dairy & Eggs

Eggs from our free-range hens. Fed on pasture, grain, and kitchen scraps. Deep or...

**\$5.00** per dozen

[View Details](#)

**Featured**  
Grass-Fed Ground Beef  
By [Zango Craft House](#)  
Meat & Poultry

80/20 ground beef from our Angus-Hershey's crosses. Dry-aged 14 days, ground fresh...

**\$9.00** per lb.

[View Details](#)

**Featured**  
Hand-Forged Bottle Opener  
By [Zango Craft House](#)  
Handmade Crafts

Rough-hewn reclaimed iron Range-steel. Each one is slightly different. A beauty...

**\$28.00** each

[View Details](#)

**Featured**  
Heirloom Tomato Mix  
By [Zango Craft House](#)  
Produce

A colorful mix of Cherokee Purple, Brandywine, and Green Zebra tomatoes. Vine-ri...

**\$5.50** per lb.

[View Details](#)

**Featured**  
Northern Blend Herbal Tea  
By [Locally Herbs & Botanicals](#)  
Plants & Herbs

Warming blend of locally grown lemongrass, fennel, holy basil, rose hips, and dried black...

**\$14.00** per 2 oz bag

[View Details](#)

◀ Prev 1 2 3 4 Next ▶

**Virginia Market Square**

Supporting local farmers, bakers, and makers in Virginia, Minnesota and the surrounding Iron Range.

**Visit Us**

June - October  
Every Thursday  
2:30 PM - 6:00 PM  
111 South 9th Avenue W  
Virginia, MN 55792

**Quick Links**

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Product Catalog — 42 products with search, category filter, price range, sort options, and pagination (Phases 4, 6, 8)

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Home / Products / Dairy & Eggs / Aged Sharp Cheddar



**Featured Product**

### Aged Sharp Cheddar

by Birchwood Creamery

**Dairy & Eggs**

**\$12.00** per 8 oz block

**Description**  
Aged 9 months on the farm from our own Jersey milk. Rich, buttery depth you will not find in grocery store cheddar.

In Stock (30 available)

Qty:

Add to Cart

[← Back to Products](#)

**Product Reviews**

No reviews yet  
Be the first to review this product!

[Log in](#) to leave a review.

---

**Related Products**

-  **Farm Fresh Eggs**  
\$5.00 per dozen  
by Birchwood Creamery
-  **Whole Milk Yogurt**  
\$6.50 per pint  
by Birchwood Creamery
-  **Fresh Chevre**  
\$8.00 per 4 oz  
by Birchwood Creamery
-  **Pastured Eggs — Large**  
\$4.50 per dozen  
by Taconite Acres

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**Product Detail** — Full product info with image, price, vendor link, related products, and review placeholder (Phases 4, 6)

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## Your Shopping Cart

	<p><b>Cardamom Pulla Braid</b> by Northwoods Bakery \$9.00 per loaf</p>	<input type="text" value="1"/> <input type="button" value="Remove"/>
	<p><b>Raw Wildflower Honey</b> by Hibernating Bear Apiary \$12.00 per 8 oz jar</p>	<input type="text" value="1"/> <input type="button" value="Remove"/>
	<p><b>Berkshire Pork Chops</b> by Taconite Acres \$14.00 per lb</p>	<input type="text" value="2"/> <input type="button" value="Remove"/>

[← Continue Shopping](#)

**Order Summary**

Subtotal (4 items) **\$49.00**

Shipping Calculated at checkout

---

**Estimated Total** **\$49.00**

Proceed to Checkout

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**Shopping Cart** — Cart with AJAX quantity updates, remove buttons, order summary, and checkout (Phases 4, 7)

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1. Shipping
2. Review & Pay

## Review Your Order

**Order Items (4)**

<b>Cardamom Pulla Braid</b> <small>by Northwoods Bakery · Qty: 1 · \$9.00 per loaf</small>	<b>\$9.00</b>
<b>Raw Wildflower Honey</b> <small>by Hibernating Bear Apiary · Qty: 1 · \$12.00 per 8 oz jar</small>	<b>\$12.00</b>
<b>Berkshire Pork Chops</b> <small>by Taconite Acres · Qty: 2 · \$14.00 per lb</small>	<b>\$28.00</b>

**Shipping Address** Edit

**Jenna Toivonen**  
412 Chestnut St  
Virginia, MN 55792

**Order Total**

Subtotal \$49.00

Shipping Free

---

**Total \$49.00**

**Payment Details**

Card
 Bank
 Affirm
 Pay

Secure, fast checkout with Link ▼

Card number:  
1234 1234 1234 1234 VISA

Expiration date:  Security code:  103

Country:  
 ▼

ZIP code:

**Pay \$49.00**

Payments processed securely by Stripe

[← Edit Shipping](#)

**Test Card:** 4242 4242 4242 4242

**Expiry:** Any future date (e.g. 12/34)

**CVC:** Any 3 digits (e.g. 123)

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**Checkout & Stripe Payment** — Multi-step checkout with order review, shipping address, and Stripe Payment Element (Phase 5)

Virginia Market Square Home Vendors Products Events About Contact Cart My Account Jenna Toivonen

Payment received! Your order #7 is being processed.

**Thank You for Your Order!**  
Order #7 was placed on April 23, 2026 at 3:45 PM

Status: Processing

Items Ordered	
 <b>Cardamom Pulla Braid</b> by Northwoods Bakery - Qty: 1 - \$9.00 per loaf	<b>\$9.00</b>
 <b>Raw Wildflower Honey</b> by Hibernating Bear Apiary - Qty: 1 - \$12.00 per 8 oz jar	<b>\$12.00</b>
 <b>Berkshire Pork Chops</b> by Taconite Acres - Qty: 2 - \$14.00 per lb	<b>\$28.00</b>

Shipping Address		Order Total	
Jenna Toivonen 412 Chestnut St Virginia, MN 55792		Subtotal	\$49.00
		Shipping	Free
		<b>Total</b>	<b>\$49.00</b>

Continue Shopping View All Orders

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**Order Confirmation** — Thank you page with order number, items, shipping address, and total (Phases 4, 5)

Virginia Market Square Home Vendors Products Events About Contact Login Register

**Log In**

Email address

Email is required.

Password

Log In

Don't have an account? [Register here](#)  
Interested in selling? [Apply as a Vendor](#)

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**Login with Validation** — Unified login for all roles with client-side validation feedback (Phases 3, 7)

**Virginia Market Square** Home Vendors Products Events About Contact Cart My Account Jenna Toivonen

## My Account

Welcome, Jenna Toivonen  
Signed in as jenna.toivonen@gmail.com [Customer](#)

**0**  
Shopping Cart  
0 items in cart

**3**  
Order History  
\$166.70 total

**Browse Products**  
Find fresh local goods

### Recent Orders

ORDER #	DATE	ITEMS	TOTAL	STATUS	
#7	Apr 23, 2026	3 items	\$49.00	Processing	<a href="#">View</a>
#3	Mar 22, 2026	2 items	\$51.36	Processing	<a href="#">View</a>
#1	Mar 10, 2026	4 items	\$66.34	Delivered	<a href="#">View</a>

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**Customer Dashboard** — Order history with status badges, cart count, and order total (Phases 4, 6)

**Virginia Market Square** Home Vendors Products Events About Contact Dashboard Margaret Korhonen

## Vendor Dashboard

Welcome, Iron Range Roots Farm  
Signed in as hello@ironrangeroots.com [Vendor](#)

**5**  
Total Products  
Active listings

**1**  
Pending Orders  
Awaiting processing

**\$26.00**  
Total Revenue  
All time

**\$16.00**  
Recent Revenue  
Last 30 days

**2**  
Total Orders  
Completed & in progress

**5**  
Items Sold  
Total units

[Manage Products](#) [View My Storefront](#)

### Recent Orders

ORDER #	CUSTOMER	DATE	YOUR ITEMS	YOUR TOTAL	STATUS
#5	Tomi Ranta	Apr 1, 2026	3 items	\$16.00	Pending
#1	Jenna Toivonen	Mar 10, 2026	2 items	\$10.00	Delivered

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**Vendor Dashboard** — Revenue metrics, product count, pending orders, and recent order table (Phases 4, 6)

**Admin Dashboard**

0 Pending Approval | 9 Active Vendors | 4 Customers | 7 Total Orders

2 unread contact submissions | 2 pending vendor applications

ORDER #	CUSTOMER	DATE	TOTAL	STATUS
#7	Jenna Toivonen	Apr 23, 2026	\$49.00	Processing
#5	Tom Ranta	Apr 1, 2026	\$27.82	Pending
#4	Sara Hill	Mar 25, 2026	\$143.38	Shipped
#3	Jenna Toivonen	Mar 22, 2026	\$51.36	Processing
#2	Mike Anderson	Mar 18, 2026	\$103.79	Processing

**Admin Dashboard** — System overview: vendors, customers, orders, pending approvals, contacts (Phases 4, 6)

**Manage Vendors**

All 9 | Pending Approval 0 | Verified 9 | Featured 8

VENDOR	CONTACT	CATEGORY	PRODUCTS	VERIFIED	FEATURED	JOINED	ACTIONS
Hibernating Bear Apiary	hello@hibernatingbearapiary.com	Honey & Preserves	6	Yes	—	Feb 12, 2026	Unverify   Feature   View
Pine Knoll Pottery	studio@pineknollpottery.com	Handmade Crafts	4	Yes	Yes	Feb 10, 2026	Unverify   Unfeature   View
Bear Country Meats	contact@bearcountrymeats.com	Meat & Poultry	4	Yes	Yes	Feb 8, 2026	Unverify   Unfeature   View
Mesabi Herbs & Botanicals	hi@mesabiherbs.com	Plants & Herbs	5	Yes	Yes	Feb 5, 2026	Unverify   Unfeature   View
Taconite Acres	fresh@taconiteacres.com	Meat & Poultry	4	Yes	Yes	Feb 3, 2026	Unverify   Unfeature   View
Range Craft House	shop@rangecrafthouse.com	Handmade Crafts	4	Yes	Yes	Feb 1, 2026	Unverify   Unfeature   View
Birchwood Creamery	info@birchwoodcreamery.com	Dairy & Eggs	5	Yes	Yes	Jan 25, 2026	Unverify   Unfeature   View
Northwoods Bakery	orders@northwoodsbakery.com	Baked Goods	5	Yes	Yes	Jan 22, 2026	Unverify   Unfeature   View
Iron Range Roots Farm	hello@ironrangeroots.com	Produce	5	Yes	Yes	Jan 20, 2026	Unverify   Unfeature   View

**Admin — Vendor Management** — All 9 vendors with verify/unverify, feature/unfeature, and view actions (Phase 4)

NAME	EMAIL	TYPE	STATUS	JOINED	LAST LOGIN	ACTIONS
Site Admin <span>You</span>	admin@virginiamarketsquare.com	Admin	Active	Apr 23, 2026	Apr 23, 2026	—
Tom Ranta	tom.ranta@gmail.com	Customer	Active	Mar 1, 2026	—	Suspend
Sara Hill	sara.hill@yahoo.com	Customer	Active	Feb 20, 2026	—	Suspend
Mike Anderson	mike.anderson@hotmail.com	Customer	Active	Feb 18, 2026	—	Suspend
Jenna Toivonen	jenna.toivonen@gmail.com	Customer	Active	Feb 15, 2026	Apr 23, 2026	Suspend
Rex Kangas Hibernating Bear Apiary	hello@hibernatingbearapiary.com	Vendor	Active	Feb 12, 2026	—	Suspend
Aino Myllymaki Pine Knoll Pottery	studio@pineknollpottery.com	Vendor	Active	Feb 10, 2026	—	Suspend
Paul Ojala Bear Country Meats	contact@bearcountrymeats.com	Vendor	Active	Feb 8, 2026	—	Suspend
Lisa Saarinen Mesabi Herbs & Botanicals	hi@mesabiherbs.com	Vendor	Active	Feb 5, 2026	—	Suspend
Eino Virtanen Tacomite Acres	fresh@tacomiteacres.com	Vendor	Active	Feb 3, 2026	—	Suspend
Art Leppanen Range Craft House	shop@rangecrafthouse.com	Vendor	Active	Feb 1, 2026	—	Suspend
Sonja Halvorsen Birchwood Creamery	info@birchwoodcreamery.com	Vendor	Active	Jan 25, 2026	—	Suspend
Dale Makinen Northwoods Bakery	orders@northwoodsbakery.com	Vendor	Active	Jan 22, 2026	—	Suspend
Margaret Korhonen Iron Range Roots Farm	hello@ironrangeroots.com	Vendor	Active	Jan 20, 2026	Apr 23, 2026	Suspend
Market Administrator	admin@virginiamn.gov	Admin	Active	Jan 15, 2026	—	Suspend

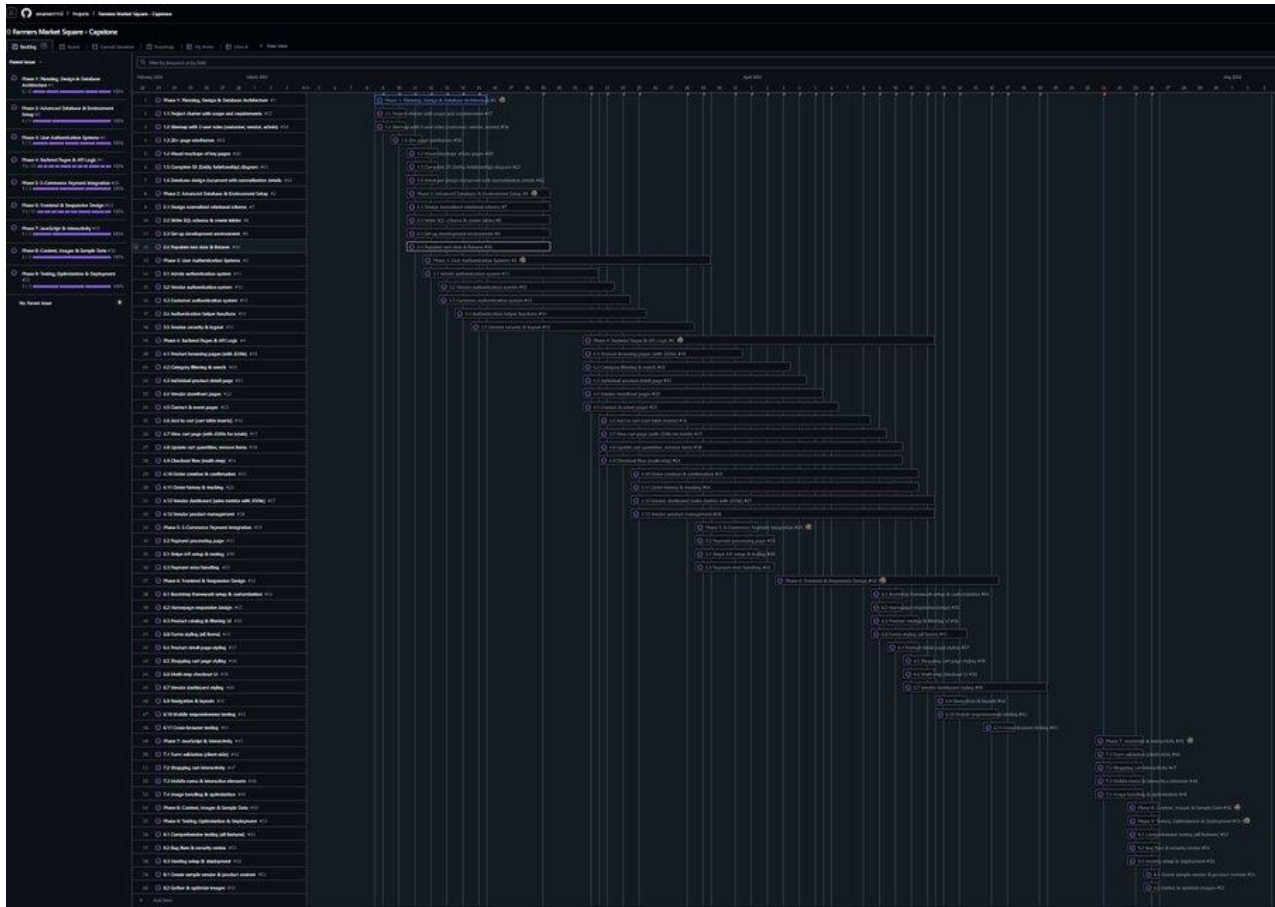
**Admin — User Management** — All 15 users with role badges, status, join dates, and suspend actions (Phase 4)



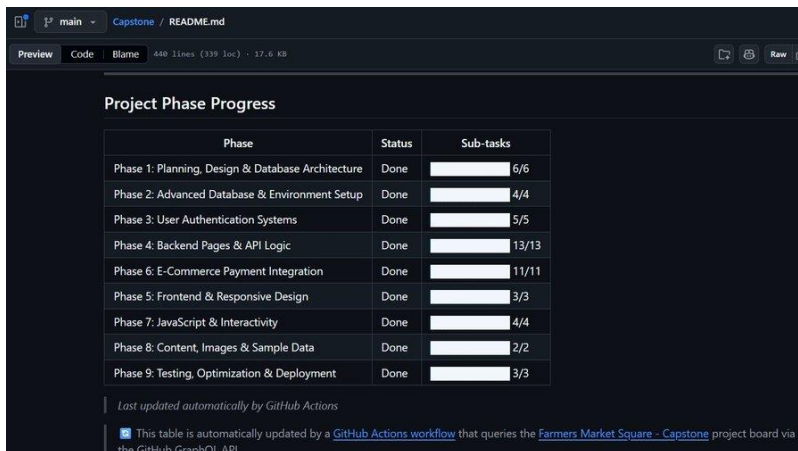
**Mobile Responsive** — Homepage on mobile viewport (375px) with hamburger menu and stacked layout (Phase 6)

## 4. Project Management Software

GitHub Projects was used as the project management tool throughout the capstone. All 48 tasks were tracked as GitHub Issues organized into 9 phases, with progress automatically updated via a GitHub Actions workflow that queries the project board through the GitHub GraphQL API.



GitHub Projects — Timeline View — All 9 phases with 48 tasks on the project timeline board



GitHub README — Auto-Updated Progress — Phase progress table automatically generated by GitHub Actions workflow

## 5. Tasks Not Completed

All 48 planned tasks across 9 phases were completed. No tasks were left incomplete or deferred.

One infrastructure item remains outstanding: SSL/TLS certificate activation on the IONOS production domain. The hosting plan's free SSL certificates are fully allocated to other domains in the account, and the system-generated domain (s1085477016.onlinehome.us) does not support custom certificate assignment through IONOS. This is a hosting provider limitation, not an application deficiency — the application implements comprehensive security at every layer: prepared statements for SQL injection prevention, bcrypt password hashing (cost 12), CSRF token protection on all forms, XSS output escaping via `htmlspecialchars()`, and Stripe PCI-compliant payment processing where card data never touches the application server.

## 6. Final Documentation

The following deliverable documents were produced as part of the capstone project:

Document	Description
<b>Comprehensive Test Report</b>	76 test cases across 10 feature areas. 100% pass rate. Authentication, browsing, cart, Stripe, three dashboards, public pages, form validation, responsive design.
<b>Security Audit</b>	45 security controls across 7 domains with OWASP Top 10 mapping. All controls rated SECURE. SQL injection, XSS, CSRF, auth, Stripe, config, input validation.
<b>Deployment Documentation</b>	Complete setup guide: tech stack, file structure, local dev (XAMPP), CI/CD pipeline (GitHub Actions), database management, crash recovery, troubleshooting.
<b>Weekly Progress Reports (7)</b>	Seven weekly reports with activity logs, reflections, proof of completed tasks, and updated project timelines across the full development cycle.
<b>Database Design Document</b>	12-table schema in 3NF with ER diagram, foreign key relationships, indexes, and design rationale.
<b>Project Charter</b>	Scope definition, user roles, feature requirements, technology stack, timeline, and success criteria.

## 7. Reflection & Conclusion

This capstone project was the most technically demanding work I have undertaken. Building a full-stack e-commerce application from scratch — with three user roles, a normalized 12-table database, Stripe payment integration, and a CI/CD deployment pipeline — required me to apply and extend every skill from my coursework in a single integrated project.

The biggest technical growth came in backend development. Writing complex SQL JOINS that pull product data with vendor names and category labels, building database transactions with rollback for order creation, and implementing session-based authentication with role-specific access control were all areas where I went from textbook understanding to practical fluency. The Stripe integration was a highlight — understanding the PaymentIntent workflow (create server-side, confirm client-side, verify server-side before touching the database) gave me real insight into how production payment systems work.

Security was a consistent theme throughout every phase, not an afterthought. By the time I documented the security audit, I had already been applying prepared statements, CSRF protection, output escaping, and bcrypt hashing from Phase 3 onward. The OWASP Top 10 mapping in the audit was not aspirational — it reflected what was already built.

The three XAMPP MySQL crashes this semester were frustrating but educational. Each recovery got faster as I refined the process, and the final consolidation of all seed data into a single importable SQL file was a direct response to the pain of running four separate patch files after every crash. That kind of iterative improvement — building better tools in response to real problems — is something I will carry into professional work.

The GitHub Actions CI/CD pipeline transformed my workflow. Knowing that every push to main automatically deploys to production through lftp, with Composer installing dependencies and sed injecting secrets from GitHub's encrypted store, gave me confidence to ship changes quickly. The automated project board status updates in the README were a nice touch that kept the repository self-documenting.

Looking back, the project scope was ambitious for 48 estimated hours — the actual 51.5 hours reflects the reality of infrastructure work (hosting setup, CI/CD, three crash recoveries) that is not visible in the feature list but is essential to a production-deployed application. I am proud that the project shipped four days ahead of schedule with all 48 tasks complete, all 76 test cases passing, and a live production site that demonstrates every feature.

Virginia Market Square is the strongest piece in my portfolio — not just because of its technical scope, but because it represents a complete development lifecycle from charter to deployment, with documentation, testing, and security built in at every step.

### PROJECT COMPLETE

9 phases · 48 tasks · 51.5 hours · Completed April 22, 2026

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