

**UNITED STATES**  
**SECURITIES AND EXCHANGE COMMISSION**  
 Washington, D.C. 20549

**FORM S-8**  
**REGISTRATION STATEMENT**  
*UNDER*  
**THE SECURITIES ACT OF 1933**

**MERCURY COMPUTER SYSTEMS, INC.**

(Exact Name of Registrant as Specified in its Charter)

Massachusetts  
 (State of Incorporation)

04-2741391  
 (I.R.S. Employer  
 Identification Number)

201 Riverneck Road  
 Chelmsford, Massachusetts 01824  
 (978) 256-1300  
 (Address of Principal Executive Offices)

MERCURY COMPUTER SYSTEMS, INC.  
 1997 Employee Stock Purchase Plan  
 (Full Title of the Plan)

Alex A. Van Adzin  
 Vice President, General Counsel, and Corporation Secretary  
 Mercury Computer Systems, Inc.  
 201 Riverneck Road  
 Chelmsford, Massachusetts 01824  
 (978) 256-1300  
 (Name, Address and Telephone Number, Including Area Code, of Agent for Service)

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer," and "smaller reporting company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer  Accelerated filer   
 Non-accelerated filer  (Do not check if a smaller reporting company) Smaller reporting company

**CALCULATION OF REGISTRATION FEE**

Title of Securities to be Registered	Amount to be Registered (1)(2)	Proposed Maximum Offering Price Per Share (3)	Proposed Maximum Aggregate Offering Price (3)	Amount of Registration Fee
Common Stock	300,000	\$10.92	\$3,276,000	\$182.80

- (1) This registration statement also covers preferred stock purchase rights (the "Rights") which are presently attached to and trade with the registrant's common stock. Any value attributable to the Rights is reflected in the market price of the common stock.
- (2) In addition, pursuant to Rule 416(a) under the Securities Act of 1933, as amended (the "Securities Act"), this registration statement also covers an indeterminate number of additional shares of common stock to be offered or sold as a result of the anti-dilution provisions of the employee benefit plan described herein, including to prevent dilution resulting from any reorganization, recapitalization, reclassification, stock dividend, stock split, or other similar change.
- (3) Calculated in accordance with Rule 457(c) and (h) under the Securities Act solely for the purpose of determining the amount of the registration fee, based on the average of the high and low prices on the NASDAQ Global Select Market on December 8, 2009.

## EXPLANATORY NOTE

This registration statement is being filed solely for the purpose of registering 300,000 additional shares of common stock, par value \$.01 per share (the "Common Stock"), of Mercury Computer Systems, Inc. (the "Company") to be offered to participants under the Mercury Computer Systems, Inc. 1997 Employee Stock Purchase Plan, as amended (the "Plan"), originally adopted in 1997 and most recently amended and restated on September 14, 2009 (and approved by the Company's shareholders on October 21, 2009). The maximum number of shares issuable under the Plan is 1,100,000 shares, of which 500,000 shares were previously registered with the Securities and Exchange Commission (the "Commission") on Form S-8 (File No. 333-53291 filed on May 21, 1998), as adjusted for a 2-for-1 stock split on December 21, 1999 pursuant to Rule 416(a) under the Securities Act, and 300,000 were previously registered with the Commission on Form S-8 (File No. 333-139020 filed on November 30, 2006, and together with the Form S-8 File No. 333-53291 filed on May 21, 1998, the "Prior Registration Statement").

Pursuant to General Instruction E of Form S-8, the contents of the Prior Registration Statement are incorporated herein by reference, except as otherwise noted below.

## PART II

### INFORMATION REQUIRED IN THE REGISTRATION STATEMENT

#### ITEM 3. INCORPORATION OF DOCUMENTS BY REFERENCE.

The following documents are incorporated herein by reference:

- (a) The Company's annual report on Form 10-K for the fiscal year ended June 30, 2009, as filed with the Commission on September 4, 2009;
- (b) The Company's quarterly report on Form 10-Q for the fiscal quarter ended September 30, 2009, as filed with the Commission on November 9, 2009;
- (c) The Company's current reports on Form 8-K filed with the Commission on July 7, 2009, August 3, 2009, September 8, 2009, September 14, 2009, October 2, 2009, and October 26, 2009;
- (d) The description of the Company's common stock contained in the Company's registration statement on Form 8-A dated January 7, 1998, as filed with the Commission pursuant to Section 12 of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), including any amendment thereto or report filed for the purpose of updating such description; and
- (e) The description of the Company's preferred stock purchase rights contained in the Company's registration statement on Form 8-A dated December 15, 2005, as filed with the Commission pursuant to Section 12 of the Exchange Act, including any amendment thereto or report filed for the purpose of updating such description.

All documents subsequently filed by the Company pursuant to Sections 13(a), 13(c), 14, and 15(d) of the Exchange Act, prior to the filing of a post-effective amendment which indicates that all securities offered hereby have been sold or that deregisters all securities then remaining unsold, shall be deemed to be incorporated by reference herein and to be a part hereof from the date of the filing of such documents.

#### ITEM 5. INTERESTS OF NAMED EXPERTS AND COUNSEL.

The validity of the Common Stock offered under this registration statement will be passed upon

for the Company by Goodwin Procter LLP, Boston, Massachusetts. Anthony J. Medaglia, Jr., who is Of Counsel at Goodwin Procter LLP, owns 28,950 shares of Common Stock and options to purchase an additional 1,010 shares of Common Stock.

**ITEM 8. EXHIBITS.**

<u>Exhibit</u>	<u>Description</u>
4.1	Articles of Organization (incorporated herein by reference to Exhibit 3.1 of the Company's annual report on Form 10-K for the fiscal year ended June 30, 2009, as filed with the Commission on September 4, 2009).
4.2	Articles of Amendment (incorporated herein by reference to Exhibit 3.2 of the Company's quarterly report on Form 10-Q for the fiscal quarter ended December 31, 2004, as filed with the Commission on February 8, 2005).
4.3	Articles of Amendment (incorporated herein by reference to Exhibit 1 of the Company's registration statement on Form 8-A, as filed with the Commission on December 15, 2005).
4.4	By-laws, as amended through September 22, 2004 (incorporated herein by reference to Exhibit 4.4 of the Company's registration statement on Form S-8 filed with the Commission on December 14, 2009).
4.5	Amendment to By-laws dated December 17, 2007 (incorporated herein by reference to Exhibit 3.1 to the Company's current report on Form 8-K, as filed with the Commission on December 20, 2007).
4.6	Amendment to By-laws dated January 21, 2008 (incorporated herein by reference to Exhibit 3.1 to the Company's current report on Form 8-K, as filed with the Commission on January 24, 2008).
4.7	Amendment to By-laws dated September 14, 2009 (incorporated herein by reference to Exhibit 3.1 to the Company's current report on Form 8-K, as filed with the Commission on September 14, 2009).
4.8	Shareholder Rights Agreement, dated as of December 14, 2005, between the Company and Computershare Trust Company, N.A. (formerly known as EquiServe Trust Company, N.A.) (incorporated herein by reference to Exhibit 2 of the Company's registration statement on Form 8-A, as filed with the Commission on December 15, 2005).
4.9	Mercury Computer Systems, Inc. 1997 Employee Stock Purchase Plan (incorporated herein by reference to Appendix B of the Company's Definitive Proxy Statement filed with the Commission on September 21, 2009).
5.1*	Opinion of Goodwin Procter LLP.
23.1*	Consent of KPMG LLP.
23.2	Consent of Goodwin Procter LLP (contained in the opinion filed as Exhibit 5.1 to this registration statement).
24.1	Power of Attorney (included in signature page to this registration statement).

\* Filed herewith.



/s/ LEE C. STEELE  
Lee C. Steele

Director

December 14, 2009

/s/ VINCENT VITTO  
Vincent Vitto

Director

December 14, 2009

/s/ RICHARD P. WISHNER  
Richard P. Wishner

Director

December 14, 2009

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\* Filed herewith.

[Letterhead of Goodwin Procter LLP]

December 14, 2009

Mercury Computer Systems, Inc.  
201 Riverneck Road  
Chelmsford, Massachusetts 01824-2820

**Re: Registration Statement on Form S-8 for Additional Shares**

Ladies and Gentlemen:

This opinion letter is furnished to you in connection with your filing of a Registration Statement on Form S-8 (the "Registration Statement") pursuant to the Securities Act of 1933, as amended (the "Securities Act"), on the date hereof relating to an aggregate of 300,000 shares (the "Shares") of Common Stock, \$0.01 par value per share ("Common Stock"), of Mercury Computer Systems, Inc., a Massachusetts corporation (the "Company"), that may be issued pursuant to the Company's 1997 Employee Stock Purchase Plan (as amended and restated through September 14, 2009) (the "Plan").

We have reviewed such documents and made such examination of law as we have deemed appropriate to give the opinion expressed below. We have relied, without independent verification, on certificates of public officials and, as to matters of fact material to the opinion set forth below, on certificates of officers of the Company.

The opinion expressed below is limited to Massachusetts law.

For purposes of the opinion expressed below, we have assumed that a sufficient number of authorized but unissued shares of the Company's Common Stock will be available for issuance when the Shares are issued.

Based on the foregoing, we are of the opinion that the Shares have been duly authorized and, upon issuance and delivery against payment therefor in accordance with the terms of the Plan, will be validly issued, fully paid and nonassessable.

We hereby consent to the inclusion of this opinion as Exhibit 5.1 to the Registration Statement. In giving our consent, we do not admit that we are in the category of persons whose consent is required under Section 7 of the Securities Act or the rules and regulations thereunder.

Very truly yours,

/S/ GOODWIN PROCTER LLP

GOODWIN PROCTER LLP

## Consent of Independent Registered Public Accounting Firm

The Board of Directors  
Mercury Computer Systems, Inc.:

We consent to the use of our report dated September 4, 2009, with respect to the consolidated balance sheets of Mercury Computer Systems, Inc. and subsidiaries as of June 30, 2009 and 2008, and the related consolidated statements of operations, shareholders' equity and comprehensive loss, and cash flows for each of the years in the three-year period ended June 30, 2009, the related consolidated financial statement schedule, and the effectiveness of internal control over financial reporting as of June 30, 2009, incorporated by reference in this Registration Statement on Form S-8.

/s/ KPMG LLP

Boston, Massachusetts  
December 14, 2009